Vol. 8, No. 13
July 15, 1983

Energy Research Abstracts

Abstracts 31018-32940

Technical Information Center
UNITED STATES DEPARTMENT OF ENERGY

CURRENT AWARENESS PUBLICATIONS ON ENERGY

To provide complete coverage of literature related to major Department programs, announcement publications that are comprehensive in their coverage of certain energy fields are issued regularly. All information in these publications, plus additional backup information, is included in the Energy Data Base of the Technical Information Center; all references are also available for machine searching via the on-line retrieval system, DOE/RECON, and the commercial on-line retrieval systems. Descriptions of these current awareness publications, which are supported either directly or indirectly by the DOE, appear below. Department of Energy components may receive the listed publications free from the Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. Telephone (615) 576-1303; (FTS) 626-1303.

PUBLICATIONS OF THE TECHNICAL INFORMATION CENTER

Energy Abstracts for Policy Analysis (EAPA)

A monthly abstract journal devoted to the analysis of energy research, conservation, and policy. Scope and coverage are limited to substantive articles or reports and emphasize the following: programmatic efforts; legislative, regulatory, and other legal aspects; social, economic, and environmental impacts; regional and sectoral analyses; institutional factors, etc. *EAPA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402; domestic subscribers $6.00, foreign $7.50 per copy; annual cumulative index, domestic $10.00, foreign $12.50 per copy. The annual subscription price is $70.00 for domestic subscribers and $87.50 for foreign subscribers.

Energy Research Abstracts (ERA)

A comprehensive semimonthly abstract journal devoted to all areas of energy-related information produced by the Department of Energy, other U. S. government organizations, and foreign governments. *ERA* is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $165.00 for domestic subscribers and $206.25 for foreign subscribers. A single issue costs $9.50 (domestic) or $11.90 (foreign).

The following publications are available to the public on a subscription basis from the National Technical Information Service (NTIS), Springfield, Virginia 22161. The annual subscription rate for one volume (calendar) year (12 issues plus cumulative index) is $75.00 for domestic subscribers and $150.00 for subscribers outside the North American continent, except as listed below for *DOE Patents Available for Licensing (PAL)*. A single issue is $7.00 (domestic) and $14.00 (outside the North American continent).

Current Energy Patents (CEP)

A monthly publication providing abstracting and indexing coverage of the international patent literature, including patent applications, that concerns any aspect of energy production, conservation, and utilization. Available as PB83-902800.

DOE Patents Available for Licensing (PAL)

DOE is prepared to grant exclusive or nonexclusive, revocable licenses under DOE-owned U. S. patents and patent applications; this semiannual publication provides abstracting and indexing coverage to this literature. Available as PB83-946800; the annual subscription price is $14.00 (domestic) and $28.00 (foreign).

Energy and the Environment (EAE)

A monthly abstract journal devoted to information on the impacts of energy-related activities and radioactive and nonradioactive pollutants on the environment. Available as PB83-914900.

Fossil Energy Update (FEU)

A monthly abstract journal devoted to information on the processing and use of fossil fuels. Available as PB83-914600.

Fusion Energy Update (CFU)

A monthly abstract journal devoted to information on controlled thermonuclear research. Available as PB83-915300.

Solar Energy Update (SEU)

A monthly abstract journal devoted to information on the utilization of solar energy, including biomass and tidal and wind power. Available as PB83-914500.

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Geothermal Energy Technology (GET)

A semimonthly current awareness bulletin devoted to information on the exploration and development of geothermal resources. Available as PB83-914700.

Nuclear Fuel Cycle (NFC)

A semimonthly current awareness bulletin covering all aspects of the nuclear fuel cycle, both front end and back end. Available as PB83-913400.

Nuclear Reactor Safety (NRS)

A semimonthly current awareness bulletin covering the following safety aspects: accident analysis, safety systems, radiation protection, decommissioning and dismantling, and security measures. Available as PB83-913500.

Radioactive Waste Management (RWM)

A semimonthly current awareness bulletin covering the following management aspects: transport and storage, waste processing, waste disposal, waste storage, radioactive effluents, and shipping containers. Available as PB83-902900.

INTERNATIONAL ENERGY PUBLICATIONS

The Technical Information Center cooperates with the following organizations in the publication of international abstract journals: (1) International Atomic Energy Agency, International Nuclear Information System, Vienna, Austria, for *Atomindex;* (2) International Energy Agency, IEA Coal Research, London, England, for *Coal Abstracts;* and (3) International Energy Agency, Biomass Conversion Technical Information Service, Dublin, Ireland, for *Biomass Abstracts*. In each case, the cognizant foreign agency provides the non-U.S. information to TIC for inclusion in the Energy Data Base; in turn, TIC provides the U.S. information for input into the respective journal.

Atomindex

A semimonthly abstract journal providing worldwide coverage of information on nuclear science and technology. *Atomindex* is available by subscription from UNIPUB, 345 Park Avenue South, New York, NY 10010. The cost of an annual subscription, 24 semimonthly issues and semiannual and annual cumulative indexes, is $290.

Biomass Abstracts

A bimonthly abstract journal with comprehensive coverage of information in any step involved in the eventual conversion of biomass to energy. *Biomass Abstracts* is available free to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Biomass Abstracts* from Biomass Conversion Technical Information Service, Institute for Industrial Research and Standards, Ballymun Road, Dublin 9, Ireland, for 42 IR pounds per year. Make checks payable to the Institute.

Coal Abstracts

A monthly abstract journal providing comprehensive worldwide coverage of information in the field of coal science and technology. *Coal Abstracts* is available to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Coal Abstracts* from IEA Coal Research, Technical Information Service, 14-15 Lower Grosvenor Place, London SW1W 0EX, England, for 100 pounds sterling per year.

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ENERGY RESEARCH ABSTRACTS

ABOUT THE TECHNICAL INFORMATION CENTER

The Technical Information Center in Oak Ridge, Tennessee, has been the national center for scientific and technical information for the Department of Energy (DOE) and its predecessor agencies since 1946. In developing and managing DOE's technical information program, the Center places under bibliographic control not only DOE-originated information but also worldwide literature on scientific and technical advances in the energy field and announces the source and availability of this information. Whereas the literature of science is emphasized, coverage is extended to DOE programmatic, socioeconomic, environmental, legislative/regulatory, energy analysis, and policy-related areas. To accomplish this mission, the Center builds and maintains computerized energy-information data bases and disseminates this information via computerized retrieval systems and announcement publications such as abstracting journals, bibliographies, and update journals. Direct access to the Center's most comprehensive data base, the Energy Data Base, is available to the public through commercial on-line bibliographic retrieval systems. The Energy Data Base and many of the Center's energy-related data bases are available to DOE offices and contractors and to other government agencies via DOE/RECON, the Department's on-line information retrieval system. The Center has developed and maintains systems to record and communicate energy-related research-in-progress information, to maintain a register of DOE public communications publications, to track research report deliverables from DOE contractors, and to test and make available DOE-funded computer software programs with scientific and management applications. The Center also maintains a full-scale publishing capability to serve special publication needs of the Department. To effectively manage DOE's technical information resources, the Center's program is one of continual development and evaluation of new information products, systems, and technologies.

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ABOUT *ENERGY RESEARCH ABSTRACTS*

Energy Research Abstracts (ERA) provides abstracting and indexing coverage of all scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs originated by the U. S. Department of Energy, its laboratories, energy centers and contractors. *ERA* also covers other energy information prepared *in report form* by federal and state government organizations, foreign governments, and domestic and foreign universities and research organizations. The user should remain aware that *ERA* coverage of non-report literature is limited to that generated by Department of Energy activity.

ERA is comprehensive in its subject scope, encompassing the DOE's research, development, demonstration, and technological programs resulting from its broad charter for energy sources, supplies, safety, environmental impacts, and regulation.

ERA is available on an exchange basis to universities, research institutions, industrial firms, and publishers of scientific information. Inquiries should be directed to the Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

ERA is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $165.00 for domestic subscribers and $206.25 for foreign subscribers. A single issue costs $9.50 (domestic) or $11.90 (foreign). The cumulative indexes will be available in printed form from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, and in microfiche form from the National Technical Information Service, U. S. Department of Commerce, Springfield, Virginia 22161, and from Engineered Systems, P. O. Box 866, Oak Ridge, Tennessee 37830.

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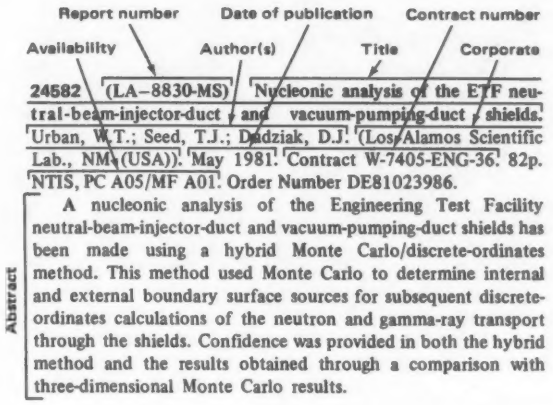
HOW TO USE *ENERGY RESEARCH ABSTRACTS*

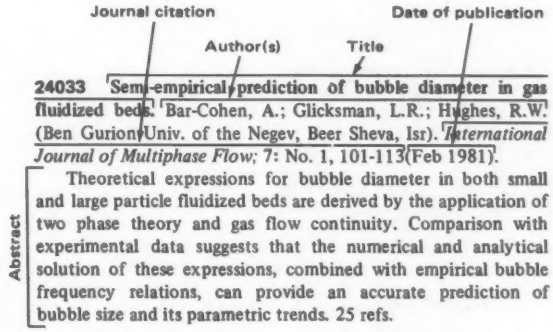
ABSTRACTS IN *ENERGY RESEARCH ABSTRACTS*

The principal elements of abstract entries for a typical research and development report and a typical technical journal article are illustrated below.



24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. (Los Alamos Scientific Lab., NM (USA)). May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

A nucleonic analysis of the Engineering Test Facility neutral-beam-injector-duct and vacuum-pumping-duct shields has been made using a hybrid Monte Carlo/discrete-ordinates method. This method used Monte Carlo to determine internal and external boundary surface sources for subsequent discrete-ordinates calculations of the neutron and gamma-ray transport through the shields. Confidence was provided in both the hybrid method and the results obtained through a comparison with three-dimensional Monte Carlo results.



24033 Semi-empirical prediction of bubble diameter in gas fluidized beds. Bar-Cohen, A.; Glicksman, L.R.; Hughes, R.W. (Ben Gurion Univ. of the Negev, Beer Sheva, Isr). *International Journal of Multiphase Flow*; 7: No. 1, 101-113(Feb 1981).

Theoretical expressions for bubble diameter in both small and large particle fluidized beds are derived by the application of two phase theory and gas flow continuity. Comparison with experimental data suggests that the numerical and analytical solution of these expressions, combined with empirical bubble frequency relations, can provide an accurate prediction of bubble size and its parametric trends. 25 refs.

INDEXES TO *ENERGY RESEARCH ABSTRACTS*

Five indexes are provided for approaching the contents of each issue of *Energy Research Abstracts (ERA)*. Each index is preceded by an introduction that details the organization of the index and the principles by which it was compiled. The reader is referred to these introductions for information not found in the index examples that follow.

• Corporate Author Index

Technical report literature is indexed using the name of the organization or institution responsible for the issuance of the report.

24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. **(Los Alamos Scientific Lab., NM (USA)).** May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

is indexed as:

Los Alamos Scientific Lab., NM (USA)
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Personal Author Index

Each author's name is indexed in the form appearing on the document abstracted, with the exception that given names are reduced to initials:

Bar-Cohen, A., Semi-empirical prediction of bubble diameter in gas fluidized beds, 7:24033 (J:US)
Dudziak, D.J., *See* Urban, W.T., 6:24582
Glicksman, L.R., *See* Bar-Cohen, A., 7:24033
Hughes, R.W., *See* Bar-Cohen, A., 7:24033
Seed, T.J., *See* Urban, W.T., 6:24582
Urban, W.T., Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Subject Index

The subject index consisting of entries naming specific materials, objects, and processes is arranged alphabetically. Document titles, informative phrases, or both specific to these entries are arranged alphabetically under the entries.

TOKAMAK ETF
Neutral Atom Beam Injection
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)
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Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Contract Number Index

DOE technical literature is indexed using contract numbers under which the literature was produced. This index contains the contract number with corresponding abstract and report numbers.

W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
	6:24582	LA–8830-MS

• Report Number Index

Technical report literature is also indexed using report numbers. This index includes information on where individual reports may be obtained. Patents and conference papers are indexed here as a matter of convenience. When a report is supplied under an Order Number, that number is included in the availability statement. An Order Number–Report Number Correlation is included for convenience.

LA–		
8830-MS	6:24582	NTIS, PC A05/MF A01. Order Number DE81023986, Distribution Category STD-20d

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SUBJECT CONTENTS (NUMERICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts*. The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

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SUBJECT CONTENTS (ALPHABETICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts*. The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS
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ENERGY RESEARCH ABSTRACTS

01 COAL AND COAL PRODUCTS

31018 **(FEU—83/1) Fossil Energy Update: a current awareness journal.** Grissom, M.C. (ed.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). Jan 1983. 271p. NTIS.

Available on a subscription basis at $75.00 per volume (calendar) year.

Fossil Energy Update (FEU) provides abstracting and indexing coverage of current scientific and technical reports, patents, journal articles, conference papers and proceedings, books, theses, and monographs from all sources on fossil energy. All information announced in FEU, plus additional backup information, is included in the Energy Information Data Base of the Department of Energy's Technical Information Center. The subject matter covered by FEU includes coal, petroleum, natural gas, oil shale, hydrogen production, hydrocarbon and alcohol fuels, electric power engineering, magnetohydrodynamic generators, fuel cells, combustion systems, and combustion chemistry.

0104 Processing

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31019 **(ANL—82-62) Instrumentation and control for fossil-energy processes.** (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 748p. (CONF-820612—). NTIS, PC A99/MF A01. Order Number DE83006229.

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The 1982 symposium on instrumentation and control for fossil energy processes was held June 7 through 9, 1982, at Adam's Mark Hotel, Houston, Texas. It was sponsored by the US Department of Energy, Office of Fossil Energy; Argonne National Laboratory; and the Society for Control and Instrumentation of Energy Processes. Fifty-two papers have been entered individually into EDB and ERA; eleven papers had been entered previously from other sources. (LTN)

31020 (ANL—82-62, pp 114-121) **Transfer of asphaltene-coated particulates from model fluids into an aqueous phase.** Khan, L.A. (Illinois State Geological Survey, Champaign). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Theoretically, particulates may be separated and removed from liquefied coal by utilizing differences of size and density; however, physical cleaning of the highly viscous effluent to remove such fine particles will not be sufficiently thorough and will necessitate a secondary cleaning of the rejected material. An alternative, physico-chemical method would utilize differences in surface properties of the effluent materials to effect a transfer of particulates to an aqueous phase. Clearly, the development of such an efficient, one-step cleaning process for the recovery of fines would be of considerable importance. One such method may be the liquid-liquid extraction of the ultra-fine particles from one aqueous medium into another. In this study, we reversed the process. First, we conditioned the effluent in benzene or xylene, as a model fluid. Then we added a particular surfactant or combination of surfactants to the model fluid in order to modify the surface of the fine mineral particles. When mixed with water, these particulates separated from the model fluid and transferred to an aqueous phase. We examined the effects of the hydrophile-lipophile balance (HLB) for a combination of surfactants, the concentrations and type of surfactant, and the mixing and centrifugation time for the extraction of the particulates from the model fluids into the aqueous phase.

31021 (ANL—82-62, pp 122-144) **Coking of SRC-II process streams.** Wen, C.S. (Gulf Research and Development Co., Pittsburgh, PA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Coking characterization of various SRC-II process streams was investigated to properly define the parameters and conditions of coke formation. Technologies such as pressure differential scanning calorimetry and thermogravimetry were used in conjunction with Fourier Transform Infrared Spectroscopy and scanning electron microscopy. Coking data from the microprocess units were correlated with data obtained from a batch autoclave, a continuous bench-scale, and a process development unit. The amount of fixed carbon plus heavy volatile matter (FC+VM/sub H/) as a composition parameter measured by the thermogravimetric determination appears to give a good correlation with the coking characteristics of various SRC-II process streams. The higher the fixed carbon plus heavy volatile matter, the higher the coking tendency exists. The degree of polymerization (Dp) measured by FT-infrared showed marked increases in atmospheric flash bottoms, vacuum tower bottoms, and solid coke samples, compared to the original coal feedstock and feed slurry. Coke formation in SRC-II streams is highly dependent on process parameters such as coal feedstock, operating temperature, residence time, hydrogen partial pressure, and heating rate. Increasing hydrogen pressure results in decreasing dissolver feed slurry coking; however, the minimum coke formation exists under certain ranges of operating temperature (~ 850°F), and residence time (50 to 60 min). This temperature and time corresponds to SRC-II reactor conditions that are normal for processing reactive bituminous coals.

31022 (ANL—82-62, pp 182-189) **Acoustic TDR temperature measurement.** Gopalsami, N.; Sheen, S.H.; Raptis, A.C. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper presents some of the preliminary results on the fabrication and testing of an acoustic Time Domain Reflectometer (TDR) system targeted for temperature measurements in coal conversion systems. Acoustic thermometry is based on the dependence of sound velocity on temperature. The technique consists of transmitting short pulses of sound waves in a thin rod with notches made at certain intervals along its length. The time interval between each pair of echoes, reflected by the notches, is measured and related to the average temperature of the corresponding segment. A feasibility study concluded that acoustic TDR is feasible for temperature measurements and profiling in coal conversion systems. This study, however, pointed out that the success of the thermometer in the hostile environment of a coal conversion plant will depend on the choice of sensor materials and on the development of appropriate electronics for isolating the echoes from the noise background. A magnetostrictive type acoustic TDR system was fabricated and tested in the laboratory. Its performance towards the targeted thermometric application was found to be satisfactory and in fact superior to a similar piezoelectric system. Two in-house materials, namely stainless steel and a tungsten-rhenium alloy, were tested for acoustic temperature sensitivity. The stainless steel has a better sensitivity than the tungsten-rhenium alloy. But the latter has

a high melting point and is a proven high temperature thermocouple material in nonoxidizing atmospheres. Further materials testing is required and will include ceramic materials as well as refractory metals and their alloys. After evaluating the materials in the laboratory, they will be field-tested to assess their performance capabilities in the hostile environment of coal conversion systems.

31023 (ANL—82-62, pp 233-246) **Conductivity probe and data acquisition for a liquefaction cold model.** Fuchs, W.; Smith, D. (Pittsburgh Energy Technology Center, PA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

A device has been developed to measure local bubble size and velocity of the gas-phase in a three-phase slurry bubble column operated at coal liquefaction flow conditions. An in situ electrical conductivity twin probe (0.3-cm gap) detects the difference in conductivity of the gas and slurry phases. The analog signal from each probe is rapidly digitized and stored on a waveform recorder and subsequently transmitted and analyzed on a minicomputer. Measured bubble length and velocity are computed from the measured response time interval between probes and the dwell time of a bubble on each probe. A probabilistic model is used to derive actual bubble sizes and velocities.

31024 (ANL—82-62, pp 247-256) **Operating experience with high temperature sonic doppler flowmeter in coal liquefaction plants.** Raptis, A.C.; Karplus, H.B.; Lawrence, W.P. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The high temperature, ultrasonic Doppler flowmeter is a nonintrusive device that was installed and tested on the high pressure slurry feed line to the preheater and the recycle line of the SRC-II pilot plant. The measurements from the ultrasonic Doppler flowmeter were compared with measurements from existing meters. The recycle line Doppler flowmeter readings were compared with those of a Venturi meter in the line, while the high pressure feed line Doppler measurements were compared with inferred flow measurements based on a materials balance concept. A consistent calibration was obtained. The high temperature acoustic Doppler flowmeter is non-intrusive and this feature is its greatest advantage over the orifice type meters that require frequent attention. At this point, however, additional work is needed to determine the following: (1) optimum operating frequency, (2) the effects of bubbles on the optimum operating frequency, (3) a mechanism that automatically observes and rejects data contaminated by the presence of excessive amounts of gas, and (4) examination of the effects of temperature, viscosity, concentration, particle size and particle size distribution on the measurement.

31025 (ANL—82-62, pp 257-262) **Evaluation of coriolis flow meters in liquefaction slurries.** Smith, W.L. (Micro Motion, Inc., Houston, TX); Nicholson, R.O. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The Micro Motion mass flow meter consists of a U-shaped sensor tube through which the fluid passes. The tube is vibrated by a magnetic driver and counter balance assembly. A magnet attached to the tube moves inside a coil attached to the counter balance. The assembly moves like a tuning fork; that is, the two parts move in opposing directions at a natural spring frequency. The magnet-coil pair reinforce this natural movement, operating the whole system as a low power oscillator. As the fluid particles move down the inlet leg of the U-tube, they experience increasing vertical velocity or acceleration due to the tube rotational velocity. The particles experience a deceleration as they move down the outlet leg of the tube. The particle acceleration and deceleration are equal in magnitude but opposite in direction. The fluid resists this acceleration and exerts forces equal in magnitude, but in the opposite direction from the accelerations. These forces are linearly proportional to the mass flow rate of the fluid. A study of the equations relating to these forces will show that the physical properties of the fluid do not influence the forces. As a result, the simple U-tube becomes a flow meter, able to measure mass flow without fluid property compensation and without in-line sensing equipment. Prior to the installation of the Micro Motion meter, the coal solvent feed rate to the reactor preheater was achieved only with great difficulty as the fluid properties varied with coal properties, temperature, recycle rates and other factors. With Micro Motion, instantaneous mass flow measurements have replaced time consuming calculations and with accuracies never before achieved.

31026 (ANL—82-62, pp 292-304) **Rapid measurement of asphaltene/preasphaltene ratios with potential for feedback control in the SRC process.** Mrochek, J.E.; Denton, M.S.; Bostick, W.D. (Oak Ridge National Lab., TN). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The economics of the SRC-I process are sensitive to produce recovery from the Kerr-McGee Critical Solvents Deashing (CSD) unit, and its optimal operation is, in turn, dependent on the asphaltene/preasphaltene (ASP/PASP) ratio of the feed. The ASP/PASP ratio may be modified to some extent by controlling treatment severity in the dissolver, providing that the operator has timely access to meaningful measurements of this ratio. We are developing a rapid, automated method to determine ASP/PASP ratios of feed material to the CSD unit which is amenable to near-on-line operation. Procedures being studied employ an inert sand column with either three- or two-solvent (hexane, benzene, and pyridine or benzene and pyridine) elution to effect a separation of CSD feed into oil, ASP, and PASP or oil + ASP and PASP fractions in approximately 15 min. Weight percent (WP) and WP ratios determined from these various fractions correlated well with tabulated SRC recovery data for the Wilsonville Pilot Plant. However, a more rapid means of monitoring is required since the time involved in solvent removal and determination of the dry weight of fractions is unacceptably long and too complex for a useful process control method. A simple in-line optical detector, employing broadbanded energy (300 to 400 nm) and a photoconductive detector, was employed together with an integrator/plotter to rapidly measure peak areas associated with the elution of individual fractions. Correlations of individual peak areas and peak area ratios determined for 11 CSD feed samples were quite reasonable, considering the difficulty in obtaining a representative small sample from the top of a drum of SRC and showed the feasibility of an automated system for near-on-line measurement.

31027 (ANL—82-62, pp 305-317) **Instrument and control design criteria for fossil energy process management.** Cunningham, R.; Stewart, C.R.; Triebel, W.K. III. (Honeywell, Inc., Fort Washington, PA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper describes a disciplined approach to Instrumentation and Control Systems applications for large and complex multiunit process plants as are required in the conversion of fossil resources to alternative fuels. This disciplined approach we refer to as a Design Criteria. The Design Criteria is both a document and a design technique which address project technical specifications and can resolve Control System philosophy issues at the overall plant level prior to the start of detail design. The discipline is a top-down approach which addresses the overall plant operating objectives and provides the framework within which to complete the detail design. It can reduce the number of iterations required to finalize systems specifications and provides significant reductions in the engineering design effort of those responsible for specific processes. Where multiple process licensors/contractors are involved, the Design Criteria acts as an overall project control systems specification, coordinating and clarifying the development of integrated and compatible control systems for each of the various processes.

31028 (ANL—82-62, pp 318-328) **Use of computer graphics to study binary distillation control alternatives.** Hill, A.G.; Howell, J.B. (Oklahoma State Univ., Stillwater). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Distillation is the separation process most widely used by the fossil energy refining industries. Previous studies have shown that using advanced control systems can conserve up to 20 percent of the energy traditionally required by this process. However, the multivariable nature of distillation control complicates the selection of the best control strategy. This paper describes a FORTRAN program that is able to simulate the performance of a binary distillation column as it responds to changes in disturbance variables and/or manipulated variables. Disturbance variables considered include feed flow rate, composition, and enthalpy, and reflux enthalpy. Manipulated variables considered include reflux flow rate and vapor boilup. The following control options may be compared: feedback control of one or both control point compositions, feedback control with decoupling, and feedback control with feedforward. Alternative control strategies may be compared in two ways: (1) on the basis of cummulative error, and (2) by visual comparison of response diagrams. The ability to prepare a graphical output illustrating the results of dynamic calculations is a key feature of this program.

31029 (ANL—82-62, pp 348-364) **Survey of near and long term uses of lumped parameter dynamic models for fossil fuel processing facilities.** Greenlee, T.L.; Ringham, M.R. (JAYCOR, San Diego, CA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper reviews the uses that can be made of nonlinear lumped parameter dynamic models in performing system engineering analysis of processing facilities. A series of near and long term systems engineering uses are outlined in terms of scope, lumped parameter model based technical approach, and the nature of analysis results. Particular emphasis is placed on (1) evaluation of process stability, (2) analog/digital control system design, (3) data analysis/test planning, and (4) use of the model as a basis for training simulator development. A low order fluidized bed gasifier model is used to illustrate these points. The approach, which is based on first principles, results in a model that is mathematically characterized by a system of first-order nonlinear ordinary differential equations. These equations, representing the entire facility with a balanced level of detail in each subsystem, are suitable for developing digital and hybrid simulations. The resulting simulations, which may run several times faster than real-time, can be used for systems engineering tasks such as (1) determination of component/system dynamic performance characteristics of baseline facility designs, (2) determination of plant operating profiles, (3) analysis of system interactions, (4) determination of measurement and control strategies, (5) analysis of performance margins, (6) investigation of failure responses and propagation, (7) development of test plans, and (8) operator training. In this paper we elaborate on these uses by discussion and examples.

31030 (ANL—82-62, pp 381-391) **Method to deduce char flow to the bi-gas reactor by heat balance.** Baetens, E.C.; Frumerman, R. (Frumerman Associates, Inc., Pittsburgh, PA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

A thermal balance method to measure char flow to the BI-GAS reactor is proposed to eliminate the need to provide supplemental fuel gas to Stage I of the reactor and to achieve better process control. The safety requirements of the BI-GAS system demand accuracy, quick response, and reliability in a char flow measurement system. A conceptual design of the measurement system and an assessment of how the system meets BI-GAS safety requirments is provided. Potential obstacles to char flow measurements by thermal balance, such as incomplete thermal equilibrium between char and steam and the effects of purge gas in the char leg, are discussed. Hardware considerations are also discussed. All hardware used by the system is commercially available making thermal balance the fastest, surest method for achieving char flow measurement.

31031 (ANL—82-62, pp 422-434) **Level measurements for high temperature coal slurries.** Gopalsami, N.; Raptis, A.C. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The problem of slurry level measurement in the high pressure separators of coal liquefaction systems is addressed in this paper. Besides high pressure, the separator vessel environment is hostile and at high temperature. A survey is made of the level measurement methods and devices that may be applicable to continuous slurry level service. The survey includes displacement, differential pressure, capacitance, electrical TDR, microwave, nuclear, and acoustic devices. Judging from the capabilities and limitations of these devices, the acoustic sensor holds promise in meeting the application requirements since it is nonintrusive, intrinsically safe, easily adaptable to high pressures and temperatures, and fairly accurate. The method of acoustic pulse-echo measurements is further investigated with regard to its feasibility in slurry level service. This entails the computation of attenuation in the slurry and vapor (gas) spaces of the separator vessel and estimation of the possible measurement ranges. With limited data available on the density, viscosity, etc. of slurries from the SRC-I pilot plant at Wilsonville, Alabama, the estimated measurement range using 100 kHz in 25 wt% coal slurry is about 2.5m. Much higher ranges are found to be possible with vapor or gaseous media. Finally, a measurement scheme is proposed for echo-ranging from the top of the vessel. However, the acoustic feasibility must be tested under actual conditions of the separator vessel since the presence of foam, turbulence, or a thick layer of coke coating inside the vessel can cause excessive attenuation of sound.

31032 (ANL—82-62, pp 455-460) **Pacific abrasive fluid letdown valve.** Condon, N.J.; O'Brien, F.R. (MCC Pacific Valves, Long Beach, CA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Control of high pressure, high temperature abrasive fluids is the objective of a new valve from Pacific Valves. The key design feature in this control component is energy dissipation through self impingement of opposing fluid streams. Both fluid velocity and erosion are thereby effectively mitigated. To further promote durability, other valve features include a two stage letdown, reusable trim and wear resistant trim materials. Typical service conditions for the valve are 2000 psi differential pressure letdown at 900°F. Abrasive slurries from coal, oil shale, diatomaceous earth or other processes can be handled. Flow tests (80 psig water) conducted on a laboratory prototype have shown a linear Cv response and good rangeability for the design. Pilot plant testing is now recommended to characterize valve performance under actual service conditions.

31033 (ANL—82-62, pp 461-468) **Design principles of low impingement type slurry letdown valves.** Illing, H.H. (Kieley and Mueller, Middletown, NY). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Elimination of both staging methods and friction principles brings us to the flow to close high recovery (low F/sub L/) streamlined angle valve for this service. In this type valve, we allow trim velocities to reach extremely high values. The flow velocity in the vena contracta becomes sonic and shock waves are generated. Each shock wave is an irreversible, pressure-reducing mechanism and by allowing a concentration of these to exist downstream, velocities are reduced to acceptable values at the exit plane. So paradoxically, the high recovery angle valve now becomes a very low recovery device. The body I.D. is sized to give velocities that are adequate to carry the slurry but low enough to keep body erosion at a negligible value, (5 to 10 ft. per second). The bowl area acts as a miniature receiver to allow some distribution of particles that would otherwise tend to contrifuge to the outside of the curve. Next, the stream is led to the seat and plug by tapered surfaces to minimize the angles of impingement. Stepping of the seat ring removes the seat ring from the primary throttling area except for very low stroke positions. At greater strokes the shoulder forms the

main restriction and erosion that takes place here does not affect seat leakage. This tight shut off capability can be extremely important in the event of block valve failure.

31034 (ANL—82-62, pp 470-476) **Block valves in liquefaction letdown service: an update.** Beasley, M. (Mogas Industries, Inc., Houston, TX); Ragle, V. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The severity of the operating conditions must always be considered when judging a valve's performance. In addition, both operators and manufactuers must learn from the failures so that both can attempt to make changes which will eliminate future problems. As regards operations, two factors are felt to have been direct contributors. The first involves operational thermal and pressure transients. These can never be predicted, nor eliminated; however, operators must continually strive to minimize their impact by observing sound operation procedures. Valve manufacturers must also review and modify their designs as necessary to accommodate a larger range of operational transients. The second factor relates to actuator specifications. Valve actuators must be sized to produce the necessary torques for actuation, but must not be oversized. Proper operating safety features such as pressure regulators on actuator air supplies must be effectively used to minimize valve damage. Valve manufacturers must also ensure that their designs will withstand a reasonable amount of overtorque. Correct material is crucial to proper valve operation and performance. Chemical compositions must be correct and physical properties must be within specified minimum and maximum values. In addition, because of characteristics of materials, certain specified minimum and maximum values. In addition, because of characteristics of materials, certain compromises may be required. The latest experience would indicate that pressure and temperature transients must be considered in valve design. This may necessitate using an alternate material for seat rings which will give better impact resistance and ductility even at the expense of reducing wear resistance to some extent.

31035 (ANL—82-62, pp 704-713) **Measurement and evaluation of a simulated underground-coal-gasification-experiment by a microprocessor system.** Guntermann, K.; Suhens, G.; Kurth, M.; Franke, F.H. (Aachen Univ. of Technology, Germany). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

In order to simulate Underground Coal Gasification (UCG), coal blocks of 4 m length and o.32 m diameter are gasified under pressure-swinging conditions in an autoclave. The large amount of data needed to adequately characterize this large scale test, and the necessity to process these data during the course of the test, requires the installation of a computer. For the characterization of the process 64 different signals are picked up (i.e. temperatures, gas analyses, mass flows, pressures). Because the frequency of the pressure change is not controlled by the computer and is subject to variation, the switching times for the pressure-regulating valve must be accurately known. This is accomplished through the use of an interrupt switch, activated each time the valve position changes. For each measurement-cycle a BASIC-program averages the value of the signals and computes mass and energy balances. A protocol of the balances and the profiles of the temperatures along the coal block are plotted for each cycle. By this procedure a comprehensive judgement is available during the test so that it is possible to make changes in operating conditions if desired. The data are transfered to a second computer, where a further detailed evaluation is done.

31036 (BMFT-FB-T—82-238) **Investigations on the removal of hydrogen fluoride and hydrogen chloride during the treatment of coal gasification gases.** Rao, B.R.; Lischer, H.; Katzer, H.; Hedden, K. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 64pp. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750239.

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Impurities in coal such as fluorine and chlorine are released as their hydrogen compounds during gasification. They have to be removed at least partially to prevent air pollution by combustion of such gases. Different analytical methods for hydrogen fluoride and hydrogen chloride were tested for their suitability for the analysis of coal gasification gases and modified due to disturbing accompanying components. The removal of hydrogen halides and ammonia by adsorption with different solutions (water, ammonium chloride, calcium hydroxide and calcium hydroxide/calcium chloride solutions) was investigated in a bubble tray column. Whereas the complete removal of hydrogen chloride was achieved with all the solutions, the maximum removal of ammonia was approx. 95%. The adsorption efficiencies decreased during the simultaneous absorption of hydrogen chloride and ammonia.

31037 (CONF-750329—5) **Liquefaction of lignite by the COSTEAM process.** Del Bel, E.; Friedman, S.; Yavorsky, P.M.; Wender, I. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). Mar 1975. 18p. NTIS, PC A02/MF A01. Order Number DE83008208.

From American Institute of Chemical Engineers meeting; Houston, TX, USA (16 Mar 1975).

Carbon monoxide, 0.7 H_2:1.0 CO and 3 H_2:1 CO mole ratio synthesis gases were employed in a process variable study of the parameters influencing the oil yield from a North Dakota lignite. A slurry composed of 30 wt % pulverized coal in anthracene oil was pumped in continuous operations into a one-liter stirred reactor where effective interphase contact was achieved by a turbine type agitator. Pressures of 2000, 3000, and 4000 psig; temperatures from 375 to 450°C and residence times of 1 and 2 hours were among the parameters evaluated. Oil yields of greater than 60 wt % of the moisture and ash free (m.a.f.) lignite were attained with carbon monoxide and 3 H_2:1 CO synthesis gas at 4000 psig, 400 and 425°C respectively, and 2 hours residence time; a maximum oil yield of 52 wt % was attained with 0.7 H_2:1 CO process gas. 6 figures, 3 tables.

31038 (CONF-751183—2) **Coal cleaning, physical.** Deurbrouck, A.W. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1975. 7p. NTIS, PC A02/MF A01. Order Number DE83008219.

From 2. seminary of the commission for Europe (United Nations) for the desulfurization of fuel and stack gas; Washington, DC, USA (11 Nov 1975).

Modern coal preparation is a viable technology. With only a slight relaxation of the US sulfur emissions standards, coal preparation represents the best short-term answer to the sulfur-in-coal problem. Certainly, cleaned coal, either as a fuel or as feedstock to the new coal conversion processes, will continue to be both economically and environmentally a desirable product.

31039 (CONF-770831—4) **Synthane process update, mid-'77.** Haynes, W.P.; Strakey, J.P.; Santore, R.R.; Lewis, R. (Energy Research and Development Administration, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). 1977. 17p. NTIS, PC A02/MF A01. Order Number DE83008231.

From 4. international conference on coal gasification, liquefaction and conversion to electricity; Pittsburgh, PA, USA (4 Aug 1977).

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The SYNTHANE pilot plant is one of four large integrated coal gasification pilot plants now in operation in the US for converting coal into high Btu gas. Construction of the pilot plant was completed in March of 1975 and the first coal was gasified on July 7, 1976. The paper presented to this symposium last year described the experience during construction and the first few tests. This paper will update that experience by discussing the progress and problems encountered in runs made during the last year.

31040 (CONF-7505154—1) **Status of R and D on coal liquefaction.** Yavorsky, P.M. (Energy Research and Development Administration, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). 1975. 2p. NTIS, PC A02/MF A01. Order Number DE83008421.

From Course on coal conversion processes; University Park, PA, USA (19 May 1975).

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Of the various approaches for converting coal liquefaction appears favored in terms of economics, confidence in reliable commercial operability, and the least time to achieve commercial implementation. Coal liquefaction plants would have no serious materials problems, operating under essentially the same conditions as now exist in refineries. Consequently, liquefaction has the potential to alleviate the clean energy shortage in less time than other methods of coal conversion. Mining of combustion coal would need to double to meet the liquefaction demand. Coal is liquefied by adding hydrogen by various techniques. The hydrogen also removes the sulfur. Using coal oil for electric power to permit the supplanted petroleum to be processed for gasoline is more economical than gasoline production from coal.

31041 (CONF-8006253—) **Coal gasification and coal hydrogenation.** (Ministerium fuer Arbeit, Gesundheit und Soziales des Landes Nordrhein-Westfalen, Duesseldorf (Germany, F.R.)). 1980. 57p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901174.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

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The present state of the development works on the coal gasification and coal hydrogenation processes carried out by the coal producing and engineering companies is presented. The coal gasification projects are the following: Texaco suspended dust gasification, Lurgi fixed-bed pressurized gasification (Ruhr 100), Shell-Koppers dust gasification, Saarberg-Otto fluidized dust gasification, high temperature fluidized bed Winkler gasification and the Rheinbraun hydrogenating gasification in the fluidized bed. The coal hydrogenation is developed on the basis of the IG technology based on the work of F. Bergius and M. Pier. Emissions of coal refining plants, plant location and permit procedure studies are treated also. Separate abstracts were prepared for 8 papers of this symposium.

31042 (CONF-8006253—, pp vp) **General review and economic significance of coal refining processes.** Peters, W. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

The substitution of petroleum and natural gas by coal can take place by liquefaction and gasification of coal on the one hand and by combustion for current generating and long-distance heat production on the other hand. Conventional gasification technologies are being developed with respect to higher gasification pressures and temperatures. Coal gasification can be carried out allothermally with high-temperature heat from a nuclear power station. Coal hydrogenation is being developed on the basis of the IG technology. The use of the fluidized bed combustion in coal fired power stations increases the thermal efficiency of the coal conversion with respect to conventional power stations.

31043 (CONF-8006253—, pp vp) **Process developments at the Ruhrkohle AG on the gasification and liquefaction of bituminous coal.** Langhoff, J. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

Ruhrkohle AG as a major German producer of bituminous coal participates competently in developments of gasification and liquefaction of coal. Together with Ruhrchemie AG the pressurized dust gasification (Texaco gasification) of a coal-water suspension is studied. The fixed-bed pressurized coal gasification of Lurgi (Ruhr 100) is developed with respect to increase the operating pressure from 25 to 100 bar in cooperation with Ruhrgas AG and Steag AG. In the field of coal hydrogenation the 'Kohleoelanlage Bottrop' is operated together with Veba Oel AG on the basis of the early IG technology in a semitechnical scale.

31044 (CONF-8006253—, pp vp) **Technology of the Shell-Koppers process.** Voelkel, H.K. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

The Shell-Koppers process is the autothermal gasification of coal dust with air and water at temperatures above 1500°C, pressures between 20 and 40 bar and residence times of one to four seconds. Practically all coals including such with up to 40 wt% ash content and up to 8 wt% sulfur content can be converted to synthesis or fuel gas of high purity with almost complete grade of conversion. The typical composition of the raw gas is the following: 71.0 volume% CO, 27.0 volume% H_2, 1.6 volume% CO_2 and 0.4 volume% H_2 and traces of other gases. The process parameters are optimized in the experimental plant at the Shell refinery in Harburg with a coal throughput of 150 tons per day. The erection of a demonstration plant with a coal throughput of 1000 tons per day is in the planning phase.

31045 (CONF-8006253—, pp vp) **Saarberg/Otto pressurized coal gasification.** Fuessmann, G. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

Since 1979 Saarbergwerke AG and Dr. C. Otto and Comp. GmbH are operating a demonstration plant in Voelklingen-Fuerstenhausen for the high temperature dust gasification of coal. The procedure is united for all coals with up to 40% ash content and without restriction to coking or other properties. The characteristic of the Saarberg/Otto gasifier is the rotating fluid slag bath with a central overflow for the slag in the burning chamber. The gasifier consists of four sections, namely (from the bottom to the top) the slag discharge system, the burning chamber, the after-gasification zone and the cooling zone. The reaction of the coal with the gasification agents is carried out at temperatures between 1650 to 2400°C.

31046 (CONF-8006253—, pp vp) **Development activities of Saarbergwerke AG on coal hydrogenation.** Wuerfel, H. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

Since 1974 Saarbergwerke AG is involved with experimental and conceptional work for the development of the IG process for coal hydrogenation especially with respect to the increase of the thermal efficiency of the process. Starting-points for development works are the decrease of the reaction pressure from 700 to 300 bar, the better heat transfer from the product vapors to the mixture of the starting product, the working up of the residue and the utilization of the strained residue. Saarbergwerke AG will put a pilot plant for coal liquefaction with a throughput of coal of 6 t/day into operation in the summer of 1980. Preliminary plans are made for technical hydrogenation plant with a capacity of ca. 2 Mio tons SKE per year. (HGOE.

31047 (CONF-8006253—, pp vp) **State of development of the gasification and liquefaction of the Rheinische Braunkohle AG.** Teggers, H. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

Rheinische Braunkohlenwerke AG is developing two gasification processes and one liquefaction process for the conversion of brown coal. The high temperature Winkler gasification is developed from the Winkler process for the fluidized bed gasification of fine coal. The main target of the development work is to increase the gasification pressure and temperature. Since 1975 a semitechnical experimental plant for the hydrogenating coal gasification in the fluidized bed is in operation for the production of SNG. A pilot plant with a carbon throughput of 6 tons/h will be put into operation at the begin of 1982. The hydrogenating liquefaction of brown coal for the production of coal oil based on the Bergius-Pier process is studied in the pilot plant scale. The main target is to decrease the operating pressure from 700 to 300 bar and to increase the coal throughput from 0.4 to 0.6 kg dry coal/l reaction space and hour.

31048 (CONF-8111140—1) Preliminary assessment of the integration of a coal gasifier into a petroleum refinery. Humphrey, J.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83010635.

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

Argonne National Laboratory, in association with Hunt Oil Company and Westinghouse Electric Corporation, has evaluated the integration of a coal gasifier into a petroleum refinery. The refinery used for this study is the 30,000 EPD Hunt Oil Company refinery in Tuscaloosa, Alabama. The refinery is required to purchase 7.5×10^6 SCFD of natural gas to satisfy fuel and feedstock requirements. This study is based on gasifying 280 tons/day of by-product petroleum coke to produce medium-Btu gas (MBG) to replace natural gas and thus convert a material of relatively low value to a product that can significantly reduce purchased-fuel costs. The gasification system used for this study is the Westinghouse Electric Corporation fluidized-bed, coal-gasification process. The major gasification-train components include the Westinghouse fluidized-bed gasifier, an air separation plant, a heat-recovery system, Selexol acid-gas removal, and a sulfur-recovery plant. The gasification train will convert a nominal 280 tons/day of petroleum coke to 790,000 SCF/hr of 365-Btu/SCF gas (equivalent to 7×10^6 SCFD of natural gas), which comes close to replacing the entire 7.5×10^6 SCFD of natural gas that must be purchased. The total capital investments for a 311-ton/day plant (280-ton/day nominal feed rate with operating factor of 90%) is estimated to be \$41 x 10^6 (1986 basis). Of this investment, approximately \$32 x 10^6 is battery-limits capital and \$5 x 10^6 represents offsites and land. Working capital is estimated at about \$3 x 10^6. Gross annual operating expenses are estimated to be \$14.55 x 10^6 and by-product credits account for \$1.92 x 10^6. This results in a manufacturing cost for the MBG in 1986 of \$4.99/10^6 Btu, based on 2.53×10^{12} Btu/yr of gas generated.

31049 (DOE/FE/05120—T5) Design and development of a high-temperature particle separator for particle control in coal-gasification plants. Final technical report. Linhardt, H.D. (Linhardt and Associates, Inc., Newport Beach, CA (USA)). 28 Feb 1983. Contract AC01-81FE05120. 143p. NTIS, PC A07/MF A01. Order Number DE83009511.

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The overall objective of the program is the design, development and test evaluation of a cost effective high velocity particle separator suitable for high temperature and high pressure coal conversion and utilization applications removing particulates as small as 2 (μm) with high collection efficiency. The development of the axisymmetrical HTPS (high temperature particle separator) resulted from Phase I, II and III efforts, where Phase IV demonstrated promising results for hot-gas clean-up application, testing an array of elements in the Westinghouse TDC facility in Waltz Mill, Pennsylvania. Additional testing at high pressure and elevated temperature was conducted in the L & A HTPS facility, demonstrating 98% collection efficiency at 1000°F and 260 psia with a total pressure drop of 1.25%. In order to complete the objectives of the program, further testing is required at 1650°F within a real gasifier environment. In summary, the L & A HTPS will be a viable and cost effective candidate for hot gas clean-up requirements of all coal conversion and utilization related projects in the future.

31050 (DOE/MC/11633—1404) Case studies of a COED-based coal-conversion process. Final report, August 1, 1979-July 15, 1980. Reklaitis, G.V. (Purdue Univ., Lafayette, IN (USA). School of Chemical Engineering). Feb 1983. Contract AC21-79MC11633. 257p. NTIS, PC A12/MF A01. Order Number DE83010174.

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The objectives of this project were to investigate the process section models developed under a previous DOE contract into a single modified COED coal-conversion process model; to conduct case studies with selected process section models; and to supplement these studies by developing several additional models. A cyclone coal/char combustor model was developed, implemented and documented. A major program of case studies involving three alternative coal-conversion-process configurations (modified COED, COGAS, and COED) was executed. The COGAS configuration proved superior to the modified COED but was shown to be quite limited in the range of feasible operating conditions. Based on a second-law analysis the COED configuration was the most energy efficient of the three. An oil-vapor-quench-process section model was developed. The key element was a three phase stage-wise absorber with external heat removal and side streams. The model was validated against literature performance data. Comparison of the two quench systems showed them to be comparable in capital cost. Finally, flowsheet models were created of three bulk methanation systems. Suitable base cases were identified for each flowsheet. Extensive experimentation was carried out to speed up integration and to improve recycle convergence calculations. Because of excessive computer charges further case studies were terminated.

31051 (DOE/MC/14400—04) Development of BEACON technology. Quarterly report, January-March 1981. (TRW Energy Systems Group, Redondo Beach, CA (USA)). Jul 1981. Contract FC21-80MC14400. 42p. NTIS, PC A03/MF A01. Order Number DE83011567.

The BEACON process involves the catalytic deposition of carbon from a gas stream containing carbon monoxide, and subsequent exposure of this carbon to a gas stream containing hydrogen or steam at elevated temperature and pressure to produce methane. The steam gasification route currently is receiving the most attention. Testing of steam gasification of BEACON carbon over a range of temperatures and pressures in bench-scale equipment has led to the conclusion that steam gasification at two temperature levels has significant advantages over steam gasification at a single temperature in terms of gasification rates and methane yields. Laboratory experiments with catalyst C77 investigated the effects of process variables, catalyst composition modifications, and feed gas compositions on carbon deposition and gasification rates, carbon monoxide and steam utilization, and cycle efficiency. Laboratory experiments to find materials that will promote the carbon deposition rate of BEACON catalysts were highly successful. Promoted catalysts showed significantly higher carbon deposition rates and carbon monoxide utilization than unpromoted catalysts. Multiple-cycle performance of BEACON catalysts also is reported.

31052 (DOE/MC/14591—1397) Coal gasification catalysis mechanisms. Final report, September 29, 1980 to November 29, 1982. Kosky, P.G.; Lamby, E.J.; Maylotte, D.H.; McKee, D.W.; Spiro, C.L. (General Electric Co., Schenectady, NY (USA). Corporate Research and Development Center). Nov 1982. Contract AC21-80MC14591. 283p. NTIS, PC A13/MF A01. Order Number DE83011051.

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A two-year effort to explore the fundamental aspects of catalytic coal char gasification is summarized. Twenty-three different pure catalysts, five binary and two ternary eutectics were used in concentrations ranging from two to fifty percent. Cation effects were monitored at constant anion; anion effects were monitored at constant cation. Mineral effects, both added and indigenous, were studied. Thirteen different gaseous atmospheres were utilized. Kinetic parameters were determined for several hundred gasification trials via thermogravimetry. These data were compared to those obtained with an isothermal packed bed reactor. While the catalyzed gasification of coal chars is highly complex, depending on a variety of physiochemical phenomena, several conclusions have been drawn. The reactions appear chemically limited at gasification conditions, rather than mass transport limited. Alkali metal salts appear to be the most effective catalysts and, within the alkali series $Cs > K > Na > Li$, though in steam it appears that hydrated salts of Li and Cs have sufficient volatility to be lost from the reaction vessel. Less effective are the alkaline earth salts which also exhibit an inverse periodic trend in efficacy with $Ba > Sr > Ca$. Anions appear to have a second order effect. The effect of varying catalyst concentration is highly dependent on the nature of the catalyst. The catalysts exhibit considerable mobility at temperatures below their melting points and even below gasification temperatures. A significant percentage of active catalyst reacts with indigenous mineral matter within the first several minutes of gasification. Then the reactivity generally remains constant until concentration effects dominate as the substrate is depleted. Enhanced mobility is also evi-

denced in the case of catalysts based upon eutectic alkali salt mixtures; reactivity is generally higher, at the same conditions, than is observed for a similar concentration of a pure alkali salt.

31053 **(DOE/MC/16372—7) Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Seventh quarterly project report, October 1982-December 1982.** Mulik, P.R.; Alvin, M.A.; Bachovchin, D.M. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center). Jan 1983. Contract AC21-81MC16372. 23p. NTIS, PC A02/MF A01. Order Number DE83011065.

This program is directed at performing experimental and analytical investigations, deriving system designs, and estimating costs to asertain the feasibility of using aluminosilicate-based getters for controlling alkali in pressurized gasifications systems. Its overall objective is to develop a comprehensive plan for evaluating a scaled-up version of the gettering process as a unit operation or as an integral part of a particulate removal device. This report briefly summarizes efforts previously completed on thermodynamic projections and system performance projections, together with current work on getter selection and qualification. Work on the thermodynamic projections has been completed and includes an update of the data base, development of alkali phase diagrams, and projections for several gasification processes. Getter selection and qualification efforts involved four tests with the leading candidate getter – emathlite – on the thermogravimetric analysis (TGA) system. Plans were also formulated for three tests with emathlite on the bench-scale unit, including one with simulated fuel gas containing water vapor and alkali.

31054 **(DOE/MC/16474—1390) User's manual for computer simulation and design of the moving-bed coal gasifier. Final report.** Wen, C.Y.; Chen, H.; Onozaki, M. (West Virginia Univ., Morgantown (USA). Dept. of Chemical Engineering). Jan 1982. Contract AT21-81MC16474. 99p. NTIS, PC A05/MF A01. Order Number DE83009533.

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A computer model of countercurrent moving-bed coal gasifier developed previously has been updated. This manual presents in detail how the computer program developed is used. The unique feature of the present gasifier model is the treatment of the pyrolysis of coal. A semi-empirical approach is taken in the present model to represent the pyrolysis zone of the bed. The pyrolysis reactions are represented by three simple chemical reactions: devolatilization, cracking and carbon deposition with empirically estimated reaction rate constants. The gasification reactions are assumed to be heterogeneous reactions. For fast reactions, diffusion is the rate controlling step while for slow reactions, the surface reactions within the pores of particles is the rate controlling step. Therefore, the rates of gasification reactions used in the model are composed of two terms,the reaction term and the diffusion term. The computer program developed can be used for both simulation and design. It can be used to simulate a gasifier to obtain the gas product distributions and coal conversion and calculate the required bed height for a given carbon conversion. A map of feasible operation ranges can then be constructed for the optimum design of a gasifier. Kinetic parameters for three different kinds of coal are specified in the program. However, the program users may change these parameters according to the guides listed in the manual if the coal used is different. In addition, the reaction rate equations may be replaced if better rate expressions become available. It is important that the user checks the assumptions, the simplifications and the limitations of this computer program before applying in order to assure that the applicability of the model is within the range specified. The scale-up and extrapolation from normal operating conditions should be done with caution and, if possible, verified through additional experimentations.

31055 **(DOE/METC—83-49) Field-scale experiment in underground gasification of coal at Pricetown, West Virginia.** Liberatore, A.J.; Wilson, M.W. (Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center). 1982. 215p. NTIS, PC A10/MF A01. Order Number DE83011052.

In October 1979, US Department of Energy successfully completed an underground coal gasification (UCG) field test in eastern bituminous coal near Pricetown, WV. The field test consisted of three major phases: (1) reverse combustion linkage, (2) link enhancement, and (3) gasification. During the gasification phase, gas with an average heating value of 121 BTU/scf was produced, which resulted in an average energy production of 346 BTU/day. Environmental surveys were performed to study the effect of the test on air and water quality. Water was monitored periodically at and near the site in streams, shallow wells, and deep wells before, during, and after the test. Ambient air was monitored continuously over the same period. Between September 12 and October 9, 1979, chemical changes occurred in the groundwater during high-pressure air injection as a result of a casing rupture in a production/injection well 205 feet below ground level. The water monitoring program effectively detected the contamination excursion and followed the deep migration of pollutants. A mass balance model was developed and used for analyzing the test data. Two-dimensional and three-dimensional thermodynamic models were developed to determine the cavity growth during UCG. The cavity growth at the end of gasification was predicted using the 3-D models and was confirmed by the field test data. Two major problems were encountered in the Pricetown I test.The first was related to restricted flow through the linked paths due to the production and buildup of tars and oils in situ. This problem was eliminated by reversing the flow of air alternately until the substances were burned away and the normal passage was restored. The other was related to aquifer pressurization due to rupture casing in one well. This type of problem could be avoided by using proper well completion design.

31056 **(DOE/PC/30019—T5) Liqiud Phase Methanol Process Development Unit: installation, operation, and support studies. Annual technical progress report No. 4, 28 September 1981-30 September 1982.** (Air Products and Chemicals, Inc., Allentown, PA (USA); Chem Systems, Inc., Tarrytown, NY (USA)). 20 Oct 1982. Contract AC22-81PC30019. 468p. NTIS, PC A20/MF A01. Order Number DE83010228.

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The objective of this project is to demonstrate the technical feasibility of indirect coal liquefaction using the Liquid Phase Methanol (LPMeOH) process. Task I - Program Planning was completed. The Phase I Report: Engineering, Cost, and Program Evaluation was submitted to DOE, and DOE approval to proceed with Phase II was granted. Revision 1 of the engineering flowsheet was issued. A unified design strategy was adopted to allow the Process Development Unit (PDU) to be capable either of liquid-fluidized or liquid-entrained operation. Heat and material balances were calculated for eight (8) design cases. The final PDU design basis was established. A Design hazards Review was conducted. The Texas Air Control Board granted an exemption from construction and operating permits. The data acquisition system and 80% of all equipment items required are in hand or in the procurement stage. Eighteen (18) items are being reused from the Chicago Liquid Phase Methanation Unit (LPM) or the Bruceton Synthoil facility. Equipment being reused from the Chicago LPM unit was shipped to LaPorte. For the CSI Laboratory PDU modifications, the Piping and Instrumentation Diagram (P and ID), equipment layout, and piping drawings were completed and major equipment was ordered. Testing of in-situ catalyst reduction/activation was completed by CSI on the first commercial catalyst candidate. Reports on a liquid-fluidized run in the CSI Fairfield Laboratory PDU and on a liquid-entrained laboratory work accomplished under advance funding were issued. Air Products and Chemicals, Inc. (APCI) completed baseline catalyst testing and shakedown of the Gas Phase Screening Reactor. Shakedown of the Stirred Autoclave Reactor is in progress. Liquid Phase methanol (LPMeOH) modeling by APCI progressed, using the Deckwer model and a Continuous Stirred Tank Reactor (CSTR) model. CSI initiated an effort to verify and refine their methanol equilibrium model.

31057 **(DOE/PC/30026—T4) Study of ebullated-bed fluid dynamics for H-Coal. Quarterly progress report No. 10, October 1-December 31, 1982.** Schaefer, R.J.; Rundell, D.N.; Shou, J.K. (Amoco Research Center, Naperville, IL (USA)). Mar 1983. Contract AC22-80PC30026. 46p. NTIS, PC A03/MF A01. Order Number DE83010961.

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The H-Coal ebullated bed reactor contains at least four discrete components: gas, liquid, catalyst, and unconverted coal and ash. Because of the complexity created by these four components, it is desirable to understand the fluid results of prior cold flow model experiments in the operating H-Coal PDU reactor in Trenton, New Jersey. Studies are planned to examine the coalescence behavior of gas bubbles in three-phase ebullated beds. The work is divided into four parts: fluid dynamics measurements on the PDU reactor, gas bubble coalescence studies at Northwestern University, cold flow and mixing tests at Amoco's Naperville Research Center, and model implmentation. The objective of this quarterly progress report is to outline progress in the first three areas. Reactor fluid dynamics studies were carried out in cold-flow pilot plant Run 224 which used the Amocat-1A catalyst. The catalysts were fluidized by nitrogen and a slurry consisting of 25 wt % coal char fines in kerosene. Analysis of Run 224 data was started and preliminary results reported. Northwestern University completed the construction of a remote-controlled traversing camera mount for the video camera and electronic devices necessary to improve the quality of the video impage and to facilitate computer data acquisition. A holographic data analysis computer program was developed for calculating the Sauter mean bubble diameter. In the liquid mixing study the experimental work for the liquid-phase mixing studies was completed. The results have been used to develop a correlation between the liquid dispersion coefficient and the process variables. The lateral gamma-ray scanning experiments across the reactor were performed in order to evaluate the radial uniformity of phase holdups.

31058 **(DOE/PC/30085—T1) Instrumentation and controls for advanced coal-utilization technologies: requirements, technology status, and R and D needs. Final technical report, August 15, 1980-August 15, 1981.** Fraize, W.E.; Goodwin, E. (Mitre Corp., McLean, VA (USA)). 14 Jul 1982. Contract AC22-80PC30085. 75p. NTIS, PC A05/MF A01. Order Number DE83011257.

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I and C needs for coal-utilization technologies at three problem definition levels are discussed. Operational (system-level) problems do not appear to pose critical R and D issues. Application of modern system control theory and technology should be adequate for the operation of complex systems, provided that the dynamic operating characteristics of all the subsystems and unit processes are well understood, at least from a controllability standpoint; this caveat characterizes I and C needs at the subsystem level. More work surely needs to e done in terms of modeling and experimental verification to understand most of the coal conversion and combustion processes (esp., fluidized-bed combustion, fluidized-bed or entrained-flow gasification, and hot and cold gas clean-up). However, the clearest focus for continuing R and D I and C lies in the need for improved sensors and measurement systems at the parameter-measurement level. Coal utilization technologies have sensing and control needs in five generic areas: temperature measurement, process stream compositional analysis, multi-component flow measurement, solids flow measurement, and level measurement. In addition, there are a few technology-specific sensing needs, such as the on-line measurement of viscosity for coal-liquid slurries, that are better addressed within the R and D program for that technology. The technology options for each of the identified generic sensing and control needs are reviewed briefly and the status of development for the major options are summarized. The major resources for much of the technology options described is the first item in the list of references. The recently completed comprehensive review of I and C options for fluidized bed combustion prepared by Herzenberg et al at Argonne National Laboratory (ANL/CEN/FE-80-15, Feb. 1981).

31059 **(DOE/PC/30243—T5) Experimental study of multiple steady states in an adiabatic coal liquefaction reactor. Progress report, September 1, 1982-February 28, 1983 .** Shah, Y.T.; Tierney, J.W.; Bhattacharjee, S.; McMahon, M. (Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering). 1983. Contract FG22-80PC30243. 17p. NTIS, PC A02/MF A01. Order Number DE83010910.

Previous work on this project has demonstrated that a small-scale batch reactor can be made to operate in an adiabatic mode by making proper compensation for heat losses. The reactor was constructed at Gulf Research and Development Laboratories. A major difficulty with the reactor was the long times required to obtain steady state. A modified reactor which should come to steady state in much shorter times has been designed and built in the laboratories of the Chemical and Petroleum Engineering Department. The design of the reactor and the results of some preliminary experimental runs are presented. 3 figures.

31060 **(DOE/PC/30299—T7) Experimental investigation of synfuel spray characteristics and combustion dynamics. Final technical report, 15 September 1980-15 November 1982.** Oeding, R.G. (Spectron Development Labs., Inc., Costa Mesa, CA (USA)). Dec 1982. Contract AC22-80PC30299. 98p. NTIS, PC A05/MF A01. Order Number DE83009752.

This report describes the results of an experimental program to investigate synthetic-fuel spray characteristics and combustion dynamics. The primary objective of the program was to obtain fundamental information on the physical characteristics of both synthetic and petroleum-based fuels in spray-combustion processes through the application of advanced optical-diagnostic techniques. The program was conducted in three phases. The first phase, cold-spray experiments, explored the spray-formation mechanisms and initial spray characteristics of synthetic and petroleum fuels for both pressure-swirl and air-assisted atomizers. Pulse-laser holography was used to visualize spray-formation processes and provide overall spray characteristics. Limited use of droplet-sizing interferometry (DSI), a light-scattering technique, provided spatial distributions of key spray parameters. The second-phase, monodisperse-droplet experiments addressed the effects of combustion on DSI droplet size and velocity measurements. Both cold and burning droplet streams were measured for several fuels and two different droplet size ranges. The third-phase, spray-combustion experiments utilized pulse-laser holography to explore the characteristics of spray flames. Spray-formation processes were visualized and droplet size and velocity data obtained for SRC-II and No. 2 fuel oil in a swirl-stabilized spray burner under both combusting and cold flow conditions.

31061 **(DOE/PC/40781—T6) Catalytic coal liquefaction. Quarterly report, January-March 1983.** Weller, S.W. (State Univ. of New York, Buffalo (USA)). 1983. Contract FG22-81PC40781. 8p. (FE—2013-23). NTIS, PC A02/MF A01. Order Number DE83010882.

The first phase has been completed of a systematic study of pretreatment variables on the low-temperature oxygen chemisorption (LTOC) by sulfided molybdenum catalysts. A series of measurements has been carried out on a Mo/Al_2O_3 catalyst (Amocat 1B) and an unsupported MoS sample of high surface area (50 to 60 m^2/g). Presulfiding of Amocat 1B decreases the subsequent LTOC value by a factor of 2 to 3, depending on the duration of H_2 treatment after sulfiding; a maximum in LTOC value appears to be reached with 4 hours of H_2 treatment at 500°C. Air-sintering of Amocat 1B results in a dramatic decrease in total surface area but only a small decrease in LTOC value. A single unsupported MoS_2 has been prepared and studied with some variation of presulfiding conditions. The conversion factor, representing the ratio of total (BET) surface area to LTOC value, shows considerable dispersion in the nine runs that have been made so far. The mean value of this ratio for these nine runs is 48.8 m^2/ml (STP) O_2; this is equivalent to a surface area per chemisorbed O_2 molecule of 182 A^2/O_2 molecule, with a 95% confidence limit of +- 34 A^2/O_2 molecule.

31062 (DOE/PC/40785—7) Exploratory study of coal-conversion chemistry. Quarterly report No. 7, November 19, 1982-February 18, 1983. Ross, D.S.; McMillen, D.F.; Ogier, W.C.; Chang, S.J.; Hum, G.P.; Mansani, R.; Green, T.K. (SRI International, Menlo Park, CA (USA)). Mar 1983. Contract AC22-81PC40785. 35p. NTIS, PC A03/MF A01. Order Number DE83011119.

Work has continued on deriving improved correlations between donor-solvent structure and coal conversion effectiveness. Addition of pyrene to tetralin has been found to increase the conversion of a low fluidity bituminous coal to THF solubles from 80 to 96%. By comparison, phenanthrene, 1-phenyl-napthlalene, and fluoranthrene increased the conversion by no more than 2 to 3 percentage points. These results support earlier suggestions that pyrene exhibits particular effectiveness as a hydrogen transfer agent. Various possible explanations for this increased effectiveness are considered in the light of previous and current work in this project on the cleavage of strong coal linkages in polycyclic aromatic and hydroaromatic solvents. Work was extended with the base-catalyzed CO/H_2O conversion system to include another Illinois No. 6 coal, PSOC-1098. The behavior of this coal is similar to another coal from the same mine, beneficiated PSOC-26, in that conversion is more effective in CO than in H_2. However, H_2 converts PSOC-1098 more effectively than it does PSOC-26, suggesting that the mineral matter catalyzes the reaction between the coal and H_2. The maximum conversions of the two coals in CO are virtually identical, although PSOC-1098 is much more reactive toward the H_2 produced by the water-gas-shift (WGS) reaction. This suggests that the active CO intermediate and Ha2 are competing for the same reactive site in the coal.

31063 (DOE/PC/50041—14) Wilsonville Advanced Coal-Liquefaction Research and Development Facility, Wilsonville, Alabama. Technical progress report, Run 241 with Illinois 6 coal. (Catalytic, Inc., Wilsonville, AL (USA)). Feb 1983. Contract AC22-82PC50041. 108p. NTIS, PC A06/MF A01. Order Number DE83007877.

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The Wilsonville R and D Facility combines three process units: a thermal hydrogenation or solvent refined coal (SRC) unit, a Critical Solvent Deashing (CSD) unit, and a catalytic hydrogenation or hydrotreater (HTR) unit. The SRC unit was designed by Catalytic, Inc., using technology initially developed in Germany and later refined by the Pittsburg and Midway Coal Mining Co. The CSD unit was designed and developed by the Kerr-McGee Corporation. The HTR unit uses H-Oil technology, developed by the Hydrocarbon Research Institute, Inc. (HRI), and was constructed by Catalytic, Inc. The combined three unit processing system is generally known as a two stage liquefaction (TSL) process. This report presents the operating results for Run 241 made in a non-integrated two stage liquefaction (NTSL) mode using Illinois 6 coal from the Burning Star mine. Coal was fed for 1615 hours. Four overall special product workup periods were selected and are analyzed herein. Two additional material balances for the hydrotreater unit are also reported. The objective of this run was the operation of the SRC, CSD, and HTR units to optimize fuel oil production with maximum SRC recovery at the CSD unit.

31064 (DOE/PETC/TR—83/5) Construction and operation of a controlled-atmosphere, programmed-temperature reaction apparatus. LaCount, R.B.; Anderson, R.R.; Helms, C.A.; Friedman, S.; Romine, W.B. (USDOE Pittsburgh Energy Technology Center, PA). 1983. 115p. NTIS, PC A06/MF A01. Order Number DE83011164.

This publication presents a detailed description of the equipment data system, and all modifications utilized to construct and operate a controlled-atmosphere, programmed-temperature reaction apparatus. The apparatus is used to examine the gases evolved from the thermal oxidative degradation or pyrolysis of (1) coal, (2) carbonaceous materials deposited on spent catalysts, and (3) other high melting organic materials. 6 figures, 1 table.

31065 (EPRI-AP—2912) Fundamental studies in the conversion of coals to fuels of increased hydrogen content: the chemistry and mechanism of coal conversion to clean fuel. Final report. Derbyshire, F.J.; Odoerfer, G.A.; Varghese, P. (Mobil Research and Development Corp., Princeton, NJ (USA). Central Research Div.). Mar 1983. 144p. NTIS, PC A07/MF A01. Order Number DE83901933.

As an extension of earlier research, an experimental program has been conducted to examine the pertinent aspects of two-stage coal conversion in which a thermal dissolution step is followed by reaction in the presence of a catalyst. The study investigated the effects of solvent quality, the reaction sequence and the reaction conditions in two stages on the overall conversion and product distribution from the liquefaction of a subbituminous coal. Single-stage catalytic coal conversions have provided a basis from which to evaluate the relative effectiveness of two-stage conversion and to identify measures for its improvement. Research on the mechanisms of coal dissolution in high-boiling compounds has identified, in addition to polycondensed aromatics, certain basic nitrogen heterocycles as effective coal solvents. An investigation of the conversion of a subbituminous coal in solvents containing 1,2,3,4-tetrahydroquinoline and of the extent of coal-solvent interations has extended the previous studies of solvent chemistry.

31066 (EUR—7849-EN) Repair of coke chamber walls of a coke battery in operation. (Commission of the European Communities, Luxembourg). 1982. 13p. Commission of the European Communities, Luxembourg.

Methods of repairing coke oven chamber walls were investigated. It was found that: a straight, vertical joint must be applied between old and new brickworks and that the joint must be filled with insulation fibre; both adjacent walls and the regenerator beneath must be kept hot during repair; and during repair and reheating, silica stretchers may not be exposed to temperature shocks of more than 104°C.

31067 (LMSC-D—877750) Development of a pilot-scale kinetic extruder feeder system and test program. Phase II: verification testing. Quarterly technical progress report, January-March 1983. (Lockheed Missiles and Space Co., Inc., Sunnyvale, CA (USA). Energy Systems). 15 Apr 1983. Contract AC21-82MC19299. 81p. (FE—19299-6). NTIS, PC A05/MF A01. Order Number DE83009538.

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This report covers the work carried our during the January-March 1983 quarter of the program. Preparations are being made to ready the equipment for the 200-h verification test program. The main effort described in this report pertains to the redesign and fabrication of the main shaft bearing and seal system, and of the seal buffer gas system. Design studies and the results of testing carried our under Contract No. DE-AC21-80MC14602 indicated that the gas seals developed by the Crane Packing Company would ease the scale-up problem. These seals, similar in geometry to a mechanical face seal, can readily be scaled to larger sizes. Since the sealing faces are noncontacting, mechanical heat buildup does not limit the operating speed or pressure capability. Because of these favorable attributes and the desire to test the coal feeder in a commercially representative configuration, the decision was made to retrofit the feeder with Crane gas seals before the start of the 200-h test program. It is recommended that the program proceed as planned.

31068 (NP—3901274) Construction and operation of a plant for continuous liquefaction of solid fuels. Dueerkop, A. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 30 Jun 1981. 105p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901274.

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The liquefaction of solid fuels (peat, coal etc.) is to be carried out in aqueous dispersion with carbon monoxide. The necessary hydrogen is forme' 'n situ by the reaction $CO + H_2O \rightarrow CO_2 + H_2$. Compared to the procedure with molecular hydrogen and oily dispersion the omission of coal drying is energetically favourable. The enormous water consumption and the temperature limita-

tion through the critical point of water have negative influence. The described pilot plant consists mainly of gas- and dispersion-feeding, preheating, tubular reactor with piston mixer, cooler and separator. The heart of this continuous liquefaction plant is the level regulation in and around the separator. Filling height probe and separator wall form a capacitor giving the required measuring signal. For the calculation of the ksub(v)-value of the regulating valve the particle diameter of the solid has to be born in mind. Various valve inserts were tested (like tungsten carbide, manganese steel), lifetimes are about 80 hours. Liquefaction runs with lignites from the Rhine and from Kassel and with Swedish peat were carried out (without evaluation of the liquid products).

31069 **(NP—3901280) Catalyst of coke gasification with hydrogen and steam by Fe, Co and Ni.** Schleicher, P. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Chemie). 12 Dec 1980. 202p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83901280.

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The present experimental work deals with the catalysis of coke gasification with hydrogen and steam by Fe, Co and Ni. A calcined, extremely ash-poor petrol coke of highest paracrystalline order was used for the experiments. The catalyst was introduced by vacuum impregnation with aqueous metal sulphate solutions. The impregnated as well as the finally thermally pretreated coke were characterized by gravimetric, microanalytical, X-ray and magnetic investigations. A solid bed pressure reactor was developed for gasification experiments which ensure a kinetically accurate performance of the experiments. The kinetics of the hydrogenating gasification of the impregnated coke can be described with one and the same reaction rate equation for the catalysis of all iron metals.

31070 **(NP—3901291) Effects of salts dissolved in water vapour on solid fuel gasification.** Baumgaertel, G. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Technische Fakultaet). 28 Jul 1981. 121p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901291.

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The hydrogenating and the water vapour gasification of coal can be catalytically accelerated by the addition of salt. Here their increased solubility in supercritical water vapour is utilized to dose the salts. Experiments show that the required catalyst amounts are relatively small and that the application target is also reached by use of supersaturated solutions of salts in water vapour under slightly reduced pressure. In the vapour gasification potassium compounds raise the reaction velocity, when calcium carbonate is added simultanously, this effect is amplified up to the factor 2. By catalysis the reaction temperature can be lowered, which means reduced energy input and shifts the product spectrum towards methane. In the hydrogenating gasification of lignite the reaction temperature is also lowered by the addition of water vapour soluted iron-II-compounds. By treatment of baking bituminous coal with a mixture of hydrogen and vapour carrying soluted $NiCl_2$, $FeCl_2$, $KHCO_3$ or $CaCl_2$ a partial hydrogenation of the coal can be achieved at temperatures below the baking temperature.

31071 **(NP—3901292) Theoretical model of the thermal decomposition of single coal grains.** Reidelbach, H. (Stuttgart Univ. (Germany, F.R.)). 30 Nov 1979. 136p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901292.

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When an arithmetic model for the pyrolytic disintegration of coal particles from open burning coal is being established, a reaction mechanism for description of chemical reactions as well as a pattern of heat and mass transport in the coal grain have to be developed. The kinetic model can be divided into five groups with 10 gross reactions: Start reaction, disintegration reactions, tar evaporation, polymerization and secondary reactions. This mechanism can be used for the calculation of slow coking as well as for quick degassing at high temperatures. Between about 400 and 1000 centigrade theoretical results and literature values harmonize. The mass transport model starts among others from a constant coefficient of permeability and considers the Nu- and Sh-number. It is represented mathematically with partial, non-linear second order differential equations, which are solved numerically. Both models are bound together in the computational program PARTICLE (Fortran). Due to unprecisely known material values during disintegration the validity of the model is still restricted. An advantage is seen in the computational optimization of the decomposition reactions in a coal conversion process, whereby the experimental expense can be reduced.

31072 **(NP—3901293) Behaviour of coal minerals under coal gasification conditions.** Bierhaus, E. (Technische Hochschule Aachen (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 19 Nov 1981. 205p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83901293.

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The coal minerals primarily consist of clays (Kaolinite, Illite), carbonates, iron sulfide (Pyrite, Markasite) and quartz. The question is persued, how the behaviour of the mineral matter under gasification conditions can be characterized in the best way. Two methods exist: 1) Coal is burnt to ashes (815°C) and according to German standard DIN 51730 the ash melting behaviour is determined. 2) Organic matter of coal is removed by plasma-cold-decarbonizing, leaving behind the mineral matter. In a 'plasma-cold-device' oxygen is led through a high frequency field, where a discharge takes place. The activated oxygen formed oxidizes the coal at 150°C maximum. The products of 1) are heated in a slightly reducing hydrogen atmosphere, the products of 2) are exposed to a strongly H_2-atmosphere at 40 bar pressure. The investigations show that because of the differing composition of the mineral matter the best method has to be chosen from case to case, so as to make a characterization regarding sintering and softening behaviour.

31073 **(SAND—82-2318) Catalyst deactivation during direct coal liquefaction.** Thakur, D.S.; Thomas, M.G. (Sandia National Labs., Albuquerque, NM (USA)). Apr 1983. Contract AC04-76DP00789. 48p. NTIS, PC A03/MF A01. Order Number DE83011373.

A review of the research and development efforts in catalytic direct liquefaction has shown that, just as in petroleum residuals refining, catalyst lifetime is more important than initial activity. Deactivation studies indicate that contamination by 20 to 30 weight percent carbonaceous material and 2 to 8 weight percent inorganics result in deactivation best described by the shell progressive deactivation mechanism. Metals contamination is confined to the outer several hundred microns of the catalyst and pore volume distributions show a marked change towards higher average pore size in support of this mechanism. Close examination of the mechanistic behavior of catalysts in direct liquefaction indicates that their primary function is hydrogenation of solvents.

0105 By-products

REFER ALSO TO CITATION(S) 31056

31074 **(EAS—E-4/82) Methanol production from natural gas or coal.** Stratton, A.; Hemming, D.F.; Teper, M. (International Energy Agency Coal Research, London (UK). Economic Assessment Service). Dec 1982. 58p. NTIS (US Sales Only), PC A04/MF A01.

This report makes a first comparison of the costs of producing methanol from coal or natural gas and comments where coal may be an increasingly attractive feedstock. It draws upon the work presented in the EAS report The Cost of Liquid Fuels from Coal. Part III. Methanol and Methanol-Derived Gasoline. The comparison between coal and natural gas as feedstock to methanol plant is heavily influenced by: relative capital costs, relative energy efficiency, and relative feedstock costs. The efficiencies of energy use can be established quite clearly and are summarized in this report. The capital costs for natural gas-fed plants have been based on an ICI cost, and they apply to construction at a new site in a developed country that is served by normal transport and other facilities. Capital costs would be higher at a remote site and even higher elsewhere. A coal-based plant of equivalent size costs about three times as much as a gas-based plant. While we have reservations about the cost of coal-based methanol plants, the major uncertainties are the relative coal and natural gas prices. Unless the region has cheap non-exportable gas, coal (often sub-bituminous or

lignite) at around $1/GJ(1979 levels) is a potentially attractive feedstock for methanol. In some particularly favorable circumstances this could extend to regions (such as Europe and Japan) where coals can be imported at around $2/GJ. Our analysis and conclusions are based on the capital costs and energy efficiencies of new natural gas or coal-based methanol plants. Obviously, these are only relevant in the context of an expanding market for methanol. This is particularly so with the large (5 to 6 Mt/y) coal-based plants, as one plant of this size represents about half the current world production. The use of methanol for engine fuel, ethylene, propylene and aromatic chemicals would allow plants of this size to be built.

31075 **EDS coal liquefaction products as petrochemical feedstocks.** Ryan, D.F.; Aczel, T. (Exxon Research & Engineering Co., Baytown, TX). *Energy Progress;* 2: No. 2, 87-90(Jun 1982).

Ethylene and propylene are derived from cracking a light-gas product blend containing ethane, propane, and mixed butanes. Additional ethylene could be obtained by cracking Exxon Donor Solvent (EDS) process light naphtha product as well as raffinate from extraction of reformate. A additional amount of propylene could also be obtained. The total ethylene yield would approximate 2% of current US consumption. The particular EDS plant configuration and process yields described were selected from design studies geared for production of petroleum products for the transportation sector. Some changes in configuration and/or process yields should be anticipated for a plant designed specifically for the production of petrochemical feedstocks. The economics have not been evaluated. 7 figures.

31076 **Gasoline extenders/octane improvers from coal liquids.** Singerman, G.M. (Gulf Research & Development Co., Pittsburgh, PA). *Energy Progress;* 2: No. 2, 100-106(Jun 1982).

The research discussed in this paper indicates that the mixture of methyl aryl ethers (MAE) derived from pehnols present in raw coal liquids is an excellent non-metallic gasoline blending agent and octane improver. Use of MAE in gasoline may help alleviate the current need for increased petroleum refining severity to make metal-free, high-octane gasoline. Additionally, removing phenols from raw-coal liquids for conversion to MAE may reduce some coal-liquid refining problems and should allow a significant reduction in hydrogen consumption needed to upgrade coal liquids. 10 tables.

0106 Properties

REFER ALSO TO CITATION(S) 31035, 31060, 31112, 31134, 31216, 32371, 32379

31077 (ANL—82-62, pp 30-40) **Magnetic resonance coal flowmeter and analyzer.** King, J.D.; Rollwitz, W.L.; De Los Santos, A. (Southwest Research Inst., San Antonio, TX). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The electron spin resonance (ESR) and nuclear magnetic resonance (NMR) properties of 22 varieties of both Eastern and Western US coals have been measured and related to the pertinent physical properties and compositions. This information has been applied to the development of an evaluated model of an instrument for measuring the mass flow, calorific value, and several constituents of coal delivered by dense phase gaseous flow through small pipes. The initial use of the instrument is the measurement of finely divided coal used to supply a fluidized bed combustor but other applications are believed feasible. The instrument senses flowing coal in a non-contacting manner by use of magnetic and electromagnetic fields. The electron and nuclear magnetic resonance data so obtained is processed by an integral microcomputer to provide a near real-time readout of the flow velocity, flow density, mass flow rate, calorific value (BTU/lb.), percent moisture, percent hydrogen and percent carbon for the burnable part of the coal. The mass flow rate and calorific value data are integrated to provide totalized flow and the total delivered heating value in BTU. The instrument design is discussed and performance information is provided, along with ESR-NMR data on the coals.

31078 (ANL—82-62, pp 153-160) **Equivalent weight determination of black acids obtained by the reductive carboxylation with bituminous and lignite coals.** Duty, R.C.; Lavin, M.J.; Chiri, I.C.; Yoon, D.B. (Illinois State Univ., Normal). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Reductive carboxylation reactions of Illinois bituminous coal were run in toluene and triethylamine with potassium, carbon dioxide and biphenyl at 100°, 200° and 300°. North Dakota lignite was reacted under the same conditions with toluene as a solvent. The percent solubility and black acid yields are presented in Table 2. The maximum solubility occurred at 200°C with a lower solubility occurring at 300°C. The ratio of the weight of the insoluble residue to that of the original coal sample was used as a measure of the solubility. An indirect way of looking at solubility would be to compare the weight ratios of the black acids to that of the insoluble residues.

31079 (ANL—82-62, pp 435-445) **Quantitative applications of gamma densitometry in the coal industry: a critique.** Shea, P. (Stanford Univ., CA); Sher, R.; Gozani, T. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper discusses the use of gamma densitometry to quantitatively assay bulk samples of coal on a continuous basis. Devices using these principles to determine mass flows are on the market, and work is progressing in several countries on instruments to determine ash content. The theoretical limits of applicability and inherent assumptions of these techniques are discussed, primarily as applied to dry bulk coal, but with some discussion of the more complicated problems of slurried coal. Gamma rays are generated by sources, usually a single radioactive element. These have several advantages over XRF, the main one being that no power is required to generate gammas. However, there are a limited number of gamma sources with useful energies, long enough half-lives to be economically useful, and clean spectra (that is, relatively few energies emitted by the source in question). Gamma densitometry measurements by single and multiple-energy transmission and backscatter measurements are discussed. A general formalism for analyzing multiple-energy systems is presented. While multi-energy systems can, in principle, pick out as many groups of elements as energies used, the matrices involved are ill-conditioned and thus require accurate measures of count rate (i.e., long counting times or high source intensities) to achieve acceptable errors. Changes in coal composition and profile of coal on a belt were also seen to be important sources of error. Transmission measurements are more amenable to analysis than backscatter, which are essentially transmission measurements made on a distributed source. In addition, transmission measurements are not restricted to low energy gamma sources, and can survey the entire bulk of coal rather than just the upper portion. The special problems of slurried coal measurements are briefly discussed.

31080 (ANL—82-62, pp 619-633) **Progress and performance of on-line analyzers of coal.** Spencer, C.M. (Science Applications, Inc., Palo Alto, CA); Brown, D.R.; Gozani, T.; Bozorgmanesh, H.; Bernatowicz, H.; Tassicker, O.J.; Karlson, F. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper describes the past year's progress in the laboratory testing of the most comprehensive Nucoalyzer, the CONAC, and the performance of a Nucoalyzer-Sulfurmeter in special field tests. Previous papers and presentations provide more detailed background information. The near real-time analysis provided by a Nucoalyzer can be used in a variety of strategies to optimize efficiency of coal use. Nucoalyzers can be used to monitor coal deliveries and achieve uniformity in coal storage and recovery. In a coal cleaning plant, on-line analysis with a Nucoalyzer can lead to optimum Btu recovery while meeting specifications for the washed coal. A Nucoalyzer can monitor the blending of different coals to maintain a key cosntituent such as sulfur below a specified level, or can predict sulfur dioxide emissions, allowing feed-forward control

to gas scrubbers and precipitators. Variability in coal feed to the boiler can lead to gross changes in thermodynamic efficiency in combustion. In addition, fouling and slagging incidents due to poor coal quality cause costly boiler shutdowns and maintenance. Nucoalyzer monitoring of key constituents and Btu in the coal feed allows operators to adjust boiler parameters for increased efficiency. To summarize, the primary advantages of Nucoalyzers relate to their ability to quickly identify changes in coal composition so that adjustments can be made in a timely manner to accommodate these changes in the process being monitored. Nucoalyzers are the only instruments available that can monitor the coal (for ash, Btu, sulfur, etc.) on-line and provide real-time continuous results. One Nucoalyzer is already working in the field, and by the time of the next Symposium we will have had performance reports on two more.

31081 (ANL—82-62, pp 643-662) **Rapid component analysis of coal samples by means of alpha backscattering.** Eddy, J.; Porges, K.G. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Alpha (Rutherford) backscattering involves relatively simple, inexpensive equipment that could be automated, and in conjunction with a sample preparation system, deliver some five sample analyses per hour. As a method of component analysis, charged particle backscattering is complementary to fluorescent x-ray or Auger electron schemes: the latter provide optimum resolution for nuclear species of large atomic mass, whereas particle scattering offers optimum resolution for low-mass species such as C, O, N, S, and Si, the principle components of coal, ash, and char. Preliminary results are reported for a number of representative coal samples; the source used in this work, Cm^{244}, has high specific activity and a long lifetime (18 years), yet is readily available. Initial work was based on a considerably wider-than-optimum solid angle, which did not permit resolution of individual ash components. However, the carbon/ash ratio was readily obtainable and Btu values which, in most cases lie within statistical error margins, could be calculated from these measurements. A stronger source would permit restriction of the solid angle and thus should improve the resolution while reducing the time required per analysis. In comparison to other coal analysis schemes, alpha backscattering produces somewhat primitive results, but also costs less than one percent of typical Ge(Li) capture gamma analysis systems; it necessarily requires some scheme of representative sampling whilst capture gamma analysis can be deployed on-line, scanning the entire coal feedline. thus, the backscattering scheme could best be used in multiple units, e.g., to ascertain the coal/ash ratio before and after some step in coal conversion or preparation, where the high cost ($1 M) of on-line systems based on capture analysis would make multiple deployment impractical.

31082 (ANL/FE—82-21) **Thermal-neutron-capture prompt gamma-emission spectra of eastern, western, and mid-continent coals and the effects of trace elements.** Herzenberg, C.L.; Olson, I.K. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 169p. NTIS, PC A08/MF A01. Order Number DE83011662.

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Prompt thermal-neutron-induced gamma-ray emission spectra have been calculated from 1.5 to 11 MeV for eastern, western, and Illinois Basin average coal compositions and also for 22 individual coal compositions exposed to a thermal-neutron flux. These include contributions to the spectra from all of the major and minor elements present in the coals, as well as from 16 trace elements. Characteristics of the spectra are discussed and correlated with the coal compositions, and the effects of trace elements analyzed.

31083 (DOE/PC/20091—T1, pp 46p, Sect.5) **Pyrite sizing and petrographic analysis of coal.** Robinson, P.D.; Crelling, J.C.; Sanner, W.S. (Southern Illinois Univ., Carbondale). Aug 1982. NTIS, PC A14/MF A01.

In Special research Service Agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982.

The purpose of this investigation was to characterize raw coal and subsequently cleaned products in support of a USDOE clean coal for liquefaction study. Work progressed in three separate areas: petrographic analyses, pyrite particel size distribution evaluation, and mineralogical analyses. This has led to three separate technical sections in this report because of specific needs and problems encountered with each section. For example, in the petrographic analysis section, all tests were either those sanctioned by the ASTM or previously documented in the literature while the pyrite particle size distribution evaluation section unfortunately could not rely upon any standard tests. Consequently, much of the effort in completing this section of the work was spent on research and development tasks necessary in order to demonstrates a viable pyrite particle sizing method. This work will in the future lead to standards for pyrite sizing in coal. The mineralogical analyses were qualitative, performed with standard power x-ray diffraction.

31084 (DOE/PC/30252—T10) **Hydrogen bonding in asphaltenes and coal liquids. Quarterly report, February 1, 1983-April 30, 1983.** Li, N.C.; Yaggi, N.F.; Loeffler, M.C. (Duquesne Univ., Pittsburgh, PA (USA). Dept. of Chemistry). 1983. Contract AC22-80PC30252. 26p. NTIS, PC A03/MF A01. Order Number DE83011064.

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Individual phenolic compounds in an SRC-II middle distillate were quantified before and after aging in the presence of Cu and O_2. The concentration of each phenolic constituent decreased, indicating that they are consumed by a reaction that occurs during aging. After aging, a pentane insoluble precipitate formed that was not present before aging. Bulk characterization of this aging product by low-voltage high-resolution mass spectrometry shows that it contains dimers, trimers, tetramers, etc., of phenols. These are the same kinds of products known to form during phenolic oxidative coupling reactions. This observation is taken as direct physical evidence that supports an earlier hypothesis that phenolic oxidative coupling reactions occur during aging of SRC-II middle distillate in Cu/O_2 environments.

31085 (DOE/PC/40810—5) **Synthesis of oligomeric models of coal-drived materials for use with GPC calibration. Quarterly report, December 1982-March 1983.** Baltisberger, R.J.; Jones, M.B. (North Dakota Univ., Grand Forks (USA). Dept. of Chemistry). Apr 1983. Contract FG22-81PC40810. 12p. NTIS, PC A02/MF A01.

The purpose of this study is to develop a useful set of GPC calibration standards for asphaltene and preasphaltene analyses. Our previous results suggest models in which coal derived preasphaltene and asphaltenes are composed of oligomeric aromatic ethers of both diaryl and furan types. We plan to synthesize a series of model oligomers that are in agreement with the average structural formulas of some selected coal preasphaltenes as determined by pmr, elemental analyses and various oxygen derivatization procedures. These model compounds will be tested for use as calibration standards for both high pressure gel permeation chromatographic and vapor pressure osmometric procedures. Their response and retention times will be compared with coal preasphaltenes to determine the suitability of the model compounds as calibration standards. Analysis of several asphaltene and preasphaltene samples for carbonyl content by two different techniques has been carried out. The results suggest a shifting of the relative amounts of carbonyl and hydroxyl oxygen during the analysis procedure. Such a result would be expected if oxidizing or reducing agents were present in the samples. If this is the case the second procedure would indicate the correct total, although the individual carbonyl and hydroxyl concentrations would be in doubt. Twelve diaryl- and oligo(aryl)-methanes have been synthesized as asphaltene and preasphaltene model compounds.

31086 (EPRI-EA—2959) **Pilot study of time variability of elemental concentrations in power-plant ash. Final report.** Switzer, P.; Eynon, B.P.; Holcombe, L.J. (Stanford Univ., CA (USA). Dept. of Statistics; Radian Corp., Austin, TX (USA)). Mar 1983. 171p. NTIS, PC A08/MF A01. Order Number DE83901929.

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This report describes the results of a pilot study conducted at a southwestern US power plant. The work evaluated the time variability of elemental concentrations in coal, precipitator ash and bottom ash, and was conducted in two phases. In phase I coal and coal ash samples were collected over a two-week period. A rigor-

ous sampling and analysis schedule was followed to determine the components of sample variability. Analysis included whole sample elemental composition and the EPA EP toxicity test. Results from Phase I showed that these four various components - time, sampling, sample preparation, and analysis - contributed to the total variability in different degrees depending on the element and method of analysis. However, the contribution from each of the four components is of noticeable proportion. Phase II concentrated on determining the time variability of the coal and coal ash chemical composition. Sampling was conducted over a 30-day period with lag times between sample pairs ranging from eight hours to two weeks. Time variability for elemental concentrations in the coal and coal ash, illustrated through variogram plots, showed four distinct behavioral trends: (1) negligible time variability compared to the variability of sample collection and analysis, (2) increasing time variability as lag time increased, reaching a maximum or plateau after a two-week lag, (3) steadily increasing time variability not leveling out up to the two-week lag, and (4) inconsistent time variability. Each variability trend requires different considerations for making sample design calculations. Cross-correlations between plant process variables (coal feed composition, boiler temperature, boiler oxygen, and electrostatic precipitator air temperature) and the ash composition showed very little correlation. 74 figures, 13 tables.

31087 **(EUR—7847-DE) Relationship between raw material quality, behaviour and product quality in the manufacture of high-grade products from lignite.** (Commission of the European Communities, Luxembourg). 1982. 63p. (In German). Commission of the European Communities, Luxembourg.

The properties of Rhenish brown coal that affect its liquefaction, briquetting (coking) and gasification behaviour were investigated. High carbon conversion rates and high yields of liquid products were obtained from brown coal rich in the hydrogen compounds liptinite, humo-detrinite and lipto-humodetrinite. Differences were found in the coking behaviour of the brown coal lithotypes, but no clear relationships were discovered. Gasification behaviour was found to be largely dependent on the preliminary coke treatment. High gasification rates were obtained by treating the coke with helium at hydrogenation temperature. (In German)

31088 **(PB—83-161422) Laser micropyrolysis of coal macerals. Annual report 1 Oct 81-30 Sep 82.** Vastola, F.J. (Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering). 23 Sep 1982. 27p. NTIS, PC A03/MF A01.

A mass analysis of the pyrolysis products, generated by heating selected coal macerals with the focused output of a pulsed ruby laser, is obtained by pyrolyzing a monolithic coal sample in the ionization chamber of a time of flight mass spectrometer. A high speed data acquisition system is used to record 32 spectra during the pyrolysis process (1-4 ms). A high degree of reproducibility can be obtained by averaging sequential spectra. Spectra were obtained for a series of coals of different rank and geographical location. Although unit mass resolution is not obtained, all coals investigated exhibited mass groupings that could be classified into 15 defined mass ranges. The relative intensities and envelope shape of these mass clusters can be used to determine the degree of aromaticity and hydroaromaticity as well as the presence of oxygen groups in the coal macerals.

0108 Waste Management

REFER ALSO TO CITATION(S) 31036, 31100, 31101, 31102, 31609, 31610, 32275

31089 (ANL—82-62, pp 571-579) **Particle size measurement using optical convolution with a double slit mask.** Tichenor, D.A. (Sandia National Labs., Livermore, CA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

A variety of methods have been developed for in situ measurement of particle-size distributions. The optical methods employed include Mie scattering, interferometry and imaging. However, no particular instrument satisfies all requirements desired in a single particle counter. The method described here is based on imaging and is therefore fundamentally limited by the resolution of optical microscopy to particle sizes of 1 μm and larger. For practical in situ measurements the method is limited to applications in which the size range of primary interest is 10 μm and larger. The double-slit method shares most of the characteristics of the variable frequency grid (VFG) method such as insensitivity to particle shape and refractive index and the capability to function in a high temperature environment using the particle incandescence as the light source. In addition to these shared features, the double-slit method offers a significantly smaller sample volume and a less complex signal from which the particle size is extracted. The smaller sample volume increases the upper limit on number density in which this system can operate. Like most other single particle counters the double-slit method can measure velocity distributions and the joint distribution of size and velocity. Using the known sample volume the particle number density and flux can also be determined.

31090 **(BNL—31083) Calcium silicate cements for desulfurization of combustion gases.** Yoo, H.J.; McGauley, P.J.; Steinberg, M. (Brookhaven National Lab., Upton, NY (USA)). Mar 1982. Contract AC02-76CH00016. 15p. NTIS, PC A02/MF A01. Order Number DE83011416.

The objective of this work is to develop an SO_2 sorbent, using commercial calcium silicate bearing Portland Cement, for desulfurizing fluidized-bed combustion gases. Development efforts were concentrated on preparing and evaluating Portland Cement Type III (PC III) pellets for fluidized-bed combustion service, since earlier studies showed that PC III was intrinsically the most reactive towards SO_2. The PC III pellets can be successfully used as a regenerative sorbent without any loss of reactive sites caused by poor regeneration. The pellets were not subject to sintering and pore destruction. The rate of sulfation reaction as well as the sulfur capture capacity increases as the pellet size becomes smaller, which is due to an increase in the total pore volume associated with the pellet size. Most of the sulfation (more than 90%) is completed in the first 70 minutes and no SO_2 is detected in the flue gas for the first 50 minutes when 45% of sulfation is achieved. Regeneration increased drastically as the regeneration temperature was increased. (MCG)

31091 **(CONF-801263—2) Leaching of metals and trace elements from sulfide-bearing coal waste in southwestern Illinois.** Krothe, N.C.; Edkins, J.E.; Schubert, J.P. (Indiana Univ., Bloomington (USA). Dept. of Geology; Argonne National Lab., IL (USA)). 1980. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83010589.

From Symposium on surface mining hydrology, sedimentology and reclamation; Lexington, KY, USA (1 Dec 1980).

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Metal sulfides, chiefly pyrite and minor sphalerite, associated with the Herrin (No. 6) coal member of the Pennsylvanian Carbondale Formation, have been concentrated in a coal refuse deposit in southern Illinois. Chemical, petrographic, and x-ray-diffraction data for 34 cores, show that the upper two meters of material have been leached of sulfides in the thirty years since washing operations ceased. Oxidation of pyrite has produced highly acid waters with high concentrations of iron, zinc (up to 200 parts per million) and toxic trace elements that have leached downward to a water system perched on the underlying Illinoisan glacial drift. Deep well samples in the refuse pile are more saturated with metals than are the runoff waters and shallow-well samples. Metal recovery does not appear to be economically feasible at this site.

31092 **(CONF-811108—24) Sulfation kinetics of calcined limestones/dolomites in a thermogravimetric analyzer: experiment, modeling, and simulation.** Fan, L.S.; Satija, S.; Wilson, W.I.; Fee, D.C.; Myles, K.M. (Ohio State Univ., Columbus (USA). Dept. of Chemical Engineering; Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 48p. NTIS, PC A03/MF A01. Order Number DE83010630.

From Annual meeting of the American Institute of Chemical Engineers; New Orleans, LA, USA (8 Nov 1981).

Experiments have been conducted with a thermogravimetric analyzer (TGA) for sulfation of various calcined limestone/dolomite sorbents under reaction conditions similar to those in a fluidized-bed combustor. The volume reaction model has been modified by the present authors to account for the heterogeneous sulfation reaction. Effects of particle size and sulfur dioxide concentration on the extent of conversion have been analyzed, based on the model. Also, numerical simulation has been made of the effect of peeling-off of the particle outer surface during sulfation. Model verification has been conducted using experimental data obtained in this study and also experimental data available in the literature. 21 figures, 3 tables.

31093 **(DOE/FC/10120—T11) Hydrogeological and geotechnical procedures manual for the disposal of fly ash and FGD waste from low-rank coals in Western strip mines.** Daly, D.; Groenewold, G.; Manz, O. (North Dakota Univ., Grand Forks (USA)). 2 Dec 1982. Contract AB18-80FC10120. 176p. NTIS, PC A09/MF A01. Order Number DE83011387.

The disposal of flue gas desulfurization and fly ash waste in surface mines was considered. The area of this study included Arizona, Colorado, Montana, Nevada, New Mexico, North Dakota, Texas, Utah, and Wyoming. Landfill and ponding have traditionally been the favored disposal modes for these wastes. However, by spring of 1983, nine western mine mouth power plants over a five state area (North Dakota, Wyoming, Colorado, New Mexico, and Texas) will be disposing of flyash or a mixture of flyash and flue gas desulfurization (FGD) waste in surface coal mines. A summary is provided of the current regulatory framework, FGD equipped power plant characteristics, and surface coal mine waste disposal site operations within the study area. Second, it is to provide a set of guidelines based on geologic and hydrologic criteria, for use in establishing flue gas cleaning waste disposal sites in surface mines.

31094 **(DOE/FC/10297—T6) Anaerobic treatment of gasifier effluents. Quarterly report No. 7.** Cross, W.H.; Chian, E.S.K.; Pohland, F.G.; Giabbai, M.; Harper, S.R.; Wang, E.; Whalen, K.; Lu, F.; Grubbs, T.; Havesh, J. (Georgia Inst. of Tech., Atlanta (USA)). Apr 1983. Contract AC18-81FC10297. 25p. NTIS, PC A02/MF A01. Order Number DE83012077.

This report summarizes the work performed during the period from January 1, 1983 through March 31, 1983 on the DOE research program on Anaerobic Treatment of Gasifier Effluents (Contract No. DE-AC18-81FC10297). The major efforts have been directed toward: (1) the operation of two anaerobic systems treating $\approx$ 10% strength raw wastewater with activated carbon replacement occuring in one system, (2) the operation of two nitrifying systems treating the anaerobic effluent, (3) the operation of both packed bed and suspended growth denitrifying systems for treating the effluent from the nitrifying systems, (4) completion of the GC/MS analysis of the spent activated carbon removed from previously operated anaerobic system, and (5) a brief, ultrafiltration - reverse osmosis, study on denitrified effluent to ascertain the feasibility of dissolved solids and trace organics removal. The progress of these efforts are depicted on the Gannt Chart along with project expenditures for the above contract and are presented in detail in this report.

31095 **(EPRI-CS—2894-Vol.1) Dry SO_2-particulate removal for coal-fired boilers. Volume 1. Demonstration of SO_2 removal on a 22-MW coal-fired utility boiler by dry injection of nahcolite. Final report.** Muzio, L.J.; Sonnichsen, T.W.; Brines, H.G.; Albrandt, A.B.; Shah, N.D. (KVB, Inc., Irvine, CA (USA)). Mar 1983. 115p. NTIS, PC A06/MF A01. Order Number DE83901988.

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A full scale demonstration of the dry removal of SO_2 with nahcolite (naturally occurring sodium bicarbonate) was conducted at Public Service Company of Colorado's Cameo Unit No. 1. This is a 22 MW coal-fired boiler retrofitted with a fabric filter. In the dry SO_2 removal process nahcolite is pulverized and injected into the flue gas stream ahead of the fabric filter and downstream of the air preheater. The nahcolite collects on the bags and the SO_2 is removed as the flue gas passes through the filter cake. The objectives of the program were (1) to demonstrate the operability of the injection technique and the level of SO_2 removal attainable on a full scale utility system under typical operating conditions, and (2) to assess the impact of nahcolite injection on the operation of the fabric filter. The test program demonstrated SO_2 removals in the range of 75 to 83 percent with the injection of a stoichiometric amount of nahcolite into the flue gas. The rate of reaction between nahcolite and SO_2 was decreased when baghouse temperature was reduced from 300°F to 275°F. This effect lessened the average SO_2 removal to nearly 40 percent when injecting near stoichiometric amounts. In addition to SO_2 removal, the dry injection of nahcolite also resulted in a simultaneous removal of nitric oxide on the order of 8 percent to 14 percent. Nahcolite injection had no substantial impact on the fabric filter operation. The rate of change in flange-to-flange pressure drop during filtration increased by about 0.1 inch H_2O/h (20 percent) due to nahcolite injection. A second phase of testing is currently planned at the Cameo facility to address the effectiveness of other sodium-based materials as dry SO_2 scrubbing agents including trona and soda ash. 28 figures, 16 tables.

31096 **(EPRI-CS—2915) Operating and maintenance costs survey of FGD systems. Final report.** Allen, B.R.; Oxley, J.H. (Battelle Columbus Labs., OH (USA)). Mar 1983. 127p. NTIS, PC A07/MF A01. Order Number DE83901935.

The primary objectives of this project were to establish a data base of costs for maintenance of existing FGD systems and to correlate these costs with such parameters as: percent sulfur in the coal, plant size, SO_2 removal requirements, etc. The scope included all operating lime or limestone wet scrubbing systems that were at least one year old. In addition to maintenance costs, operating costs were also addressed. It was found that these are large year-to-year variations in total maintenance costs for existing FGD systems. The range of costs for the collection of systems is very large. Furthermore, the existing cost data cannot be used to accurately predict future maintenance costs.

31097 **(MRP/MSL—78-230(IR)) Extraction of alumina from fly ash and furnace deposits from Hat Creek coal by the modified lime-sinter process.** Ripley, L.G. (Department of Energy, Mines and Resources, Ottawa, Ontario (Canada). Mineral Sciences Lab.). Dec 1978. 67p. Department of Energy, Mines and Resources, Mineral Sciences Labs., Ottawa, Ontario.

The modified lime-sinter process has been successfully applied to the solid combustion products from Hat Creek (British Columbia) coal. Particle size was found not to be a serious problem, but -200 mesh material gave the most consistent results. The deleterious effect caused by moderate amounts of iron oxide in these materials on the extractibility of alumina could be lessened, but not eliminated, by the use of a magnetic separation prior to compounding the sinter mixture. The removal of iron oxide was not improved by hydrogen reduction prior to the magnetic separation. The ineffectiveness of this technique is attributed to the nature of the material. The non-magnetic fractions of Hat Creek fly ash, Hat Creek electrostatic precipitator material, and Hat Creek furnace deposit gave the following maximum values for extractable alumina by the modified lime-sinter process: 89%, 90%, and 91%, respectively.

0109 Environmental Aspects

REFER ALSO TO CITATION(S) 31119, 31143

31098 (CONF-8006253—, pp vp) **Environmental aspects of coal gasification and coal hydrogenation.** Juentgen, H. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

The environmental aspects of the gasification and liquefaction of coal are presented from a technical point of view by mean of the composition of the coal, the mode of operation of the coal conversion processes and the substances emitted in such processes. Two gasification processes with extremely different parameters, namely Lurgi pressurized gasification and Koppers-Totzek dust ga-

sification are discussed concerning the specific emission sources and the specific solution of the emission problems. Sulfur and solid particles can be removed to a large extend from the product gas. Therefore the combustion of town gas or SNG produced from coal produces minimal SO_2 and no dust emissions. Emissions from gasification plants are rather low because on the one hand the waste gas streams are moderate and on the other hand effective purifying methods are available. Similar criterions are also valid for coal hydrogenation plants.

31099 **(ORNL/TM—7672) Management of public impacts in surface mining.** Seddon, J.; Petrich, C.H. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 102p. NTIS, PC A06/MF A01. Order Number DE83011067.

This document examines the place of visual resources in the implementation of the Surface Mining Control and Reclamation Act of 1977 (PL 95-87). Although cited in the Act, and responsible for much of its public support, visual resources are not specifically addressed in federal or state regulations controlling surface mining for coal. Because visual resources are composed of many other resources, and affect large numbers of people, there is no simple management procedure. A workshop was convened to explore this problem; its recommendations are the basis for this report. The report discusses the ways in which surface mining and reclamation operations affect visual resources and it explores the significance of local visual resources as a reflection of the life of the community that supports the mining activity. The management of visual resources should be done within the context of the land-use pattern of the mining area - surrounding uses, transportation facilities, and the way the operation is actually seen. There is discussion of specific issues related to land use that have emerged in implementing the Act. The importance of using regional and local characteristics as a basis of regulatory policy, rather than applying uniform standards is emphasized. Of equal importance are the needs to coordinate the management of impacts to avoid conflicting standards and to involve a wide range of local interests as well as technical disciplines in determining the optimum management program for the proposed mining area. A concept is proposed for coordinating the various interests that should be involved in implementing the Act. The conclusion reached is that land use and visual resources are closely interrelated and combine aspects of many resources. Therefore, they provide a focus useful to regulatory programs in coordinating the management of other impacts. In this manner reclamation required by PL 95-87 can provide increased benefits to the area involved.

31100 **(PB—83-153148) Coal ash disposition in Maryland, 1950 through 1980. Volume I. Final report.** Simek, E.M.; Demeter, C.P.; Klose, P.N. (Environmental Resources Management, Inc., West Chester, PA (USA)). Sep 1982. 86p. NTIS, PC A05/MF A01.

Coal ash production and disposition in Maryland are reviewed for the period 1950-1980. Approximately forty disposal sites were identified and screened for potential environmental impact on groundwater or surface water systems.

31101 **(PB—83-153155) Coal ash disposition in Maryland, 1950 through 1980. Volume II. Appendices. Final report.** Simek, E.M.; Demeter, C.P.; Klose, P.N. (Environmental Resources Management, Inc., West Chester, PA (USA)). Sep 1982. 58p. NTIS, PC A04/MF A01.

Coal ash production and disposition in Maryland are reviewed for the period 1950-1980. Approximately forty disposal sites were identified and screened for potential environmental impact on groundwater or surface water systems. Appendices include (1) Ash Collection and Disposition Tables; (2) Detailed Site Maps; and (3) Coal Ash and Ash Leachate Data.

31102 **(PB—83-156422) Planning and management of mine-cut lakes at surface coal mines. Final report Aug 81-May 82.** Nelson, R.W.; Orsborn, J.F.; Logan, W.J. (Nelson (R. Wayne) and Associates, Inc., Boulder, CO (USA)). May 1982. 248p. NTIS, PC A11/MF A01.

This manual was prepared to guide the coal industry and regulatory agencies in the planning, design and management of surface coal mine lakes created by mining cuts when left as permanent water impoundments. The manual describes and illustrates important physical, chemical and biological principles aimed at producing lakes valuable for fish and wildlife, recreation, water supply and other purposes.

0110 Reserves And Exploration

REFER ALSO TO CITATION(S) 31119

31103 **(ANL—82-62, pp 663-670) Use of natural gamma radiation in the coal mining industry.** Wykes, J.S.; Adsley, I.; Cooper, L.R. (National Coal Board, Burton-on-Trent, England). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The technique of delineating coal seams by the use of natural gamma borehole logging sondes has been known for many years. The principle of the technique is that the gamma fluxes in shales are higher than in coals as the abundance of naturally occurring radionuclides is some twenty times greater in the former. This paper discusses other applications where the differeing natural gamma properties of coals and shales can be used. These are: (a) To distinguish between stone (shale) and run-of-mine coal on conveyor belts. A common situation underground is one in which stone from development headings and normal run-of-mine coal have to be batched along the same conveyor system. A natural gamma device capable of distinguishing between such batches of material, and thus allowing suitable mechanical separation, will be described. (b) To provide an accurate measurement of roof coal thickness by measuring the natural gamma flux penetrating the roof coal. To illustrate this examples will be given where this technique is used to provide automatic controlled steering of Long Wall Shearers and to provide manually assisted steering of In-seam Heading Machines.

31104 **(DOE/ET/12177—2) Geologic investigation of roof and floor strata: longwall demonstration, Old Ben Mine No. 24. Prediction of coal balls in the Herrin Coal. Final technical report: Part 2.** DeMaris, P.J.; Bauer, R.A.; Cahill, R.A.; Damberger, H.H. (Illinois State Geological Survey, Urbana (USA)). Apr 1983. Contract FG01-78ET12177. 77p. NTIS, PC A05/MF A01. Order Number DE83011414.

Coal-ball areas, large deposits of mineralized peat in the coal seam, obstructed longwall mining in the Herrin Coal at Old Ben Mine No. 24. In-mine mapping located coal balls under transitional roof - areas where the roof lithology alternates between the Energy Shale and the Anna Shale/Brereton Limestone. Specifically, coal balls occur under eroded exposures or windows of the marine Anna Shale/Brereton Limestone in the Energy Shale. Two types of coal-ball areas have been identified, based on stratigraphic position in the coal seam: type I is restricted to the top of the seam, and type II occurs at midseam and below. To predict the distribution of coal balls, as well as explain their formation, a depositional model was developed: First, freshwater sediments buried the Herrin peat. Decomposition of the sealed peat continued, producing high CO_2 partial pressures; then selective erosion took place as a river removed the cover along sinuous paths, cutting through to the peat in some places. With the seal broken, CO_2 was released, and freshwaters that contained Ca and Mg ions flushed out organic acids. Later, marine mud buried both the freshwater sediments and the exposed peat, which accounts for the transitional roof over the Herrin Coal and the coal balls under the marine shale windows in the Energy Shale. The depositional model was supported by the first comprehensive set of geochemical data for coal balls. Coal balls generally contained less than 4 percent organic carbon and very low levels of detrital minerals. Although individual sites of concentrated coal balls cannot be predicted, the specific linear roof exposures associated with these coal-ball areas can be identified by mapping. Based on previously mapped areas, the trends of these linear exposures can be projected.

31105 **(NP—3901286) Studies on improved recognition of cyclic stratification in case of homogeneous and stratified caprock.** Denzau, H.J.T. (Technische Univ. Berlin (Germany, F.R.). Fachbereich Bergbau und Geowissenschaften). 24 Apr 1981. 189p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83901286.

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The author investigates the possibility of recognizing cyclic stratification with different caprock conditions. The investigations have been carried out using two-dimensional physical models with seismic parameters reflecting those of Ruhr coal seams. Thin, alternating strata raise special seismic problems due to interferences between the primary reflections of the strata boundaries and the short term multiples within and between the strata. Transit time, amplitude, and frequency studies have been carried out on interference signals of single seams and stratified seams with homogeneous caprock. The thickness also of very thin seams can be determined from the amplitudes only in case of single seams.

0120 Mining

REFER ALSO TO CITATION(S) 31155, 31167, 31168, 31894

31106 **(ACIRL-PR—82-5) Report on horizontal longhole drilling at West Cliff Colliery.** Allan, J. (Australian Coal Industry Research Labs. Ltd., North Ryde). Jul 1982. 68p. Australian Coal Industry Research Labs. Ltd., North Ryde.

Results of field trials of the Acker 'Big John' drilling rig for drilling horizontal long holes in coal seams at West Cliff Colliery are described. A total of nine holes were drilled, with a length of 471 metres for the longest hole. Vertical guidance of the drill string within the coal seam was achieved easily, but lateral deviation was a problem. Six of the holes were drilled in advance of the longwall gateroad development panels to alleviate both the emission of methane in the face area and to reduce the propensity of the coal to outburst. Significant flows of methane were obtained from these drainage holes. (4 refs.)

31107 **(CONF-7708130—1) Hydraulic transportation for coal mining.** Miscoe, A.J. (Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Mining and Safety Research Center). Aug 1977. 35p. NTIS, PC A03/MF A01. Order Number DE83007818.

From Workshop on materials handling for tunnel construction; Keystone, CO, USA (3 Aug 1977).

This discussion is limited to the adaptation of hydraulic transport to underground coal mine haulage systems, with little extension to tunneling. Problem areas are discussed: lack of engineering design data, pumps, feeders, crushers, separators, pipelines, and instrumentation. Economic aspects are also considered. The history of hydraulic haulage installations is reviewed, including the BM Hydraulic Transport Research Facility at Bruceton, PA. (DLC)

31108 (CONF-8205152—, pp vp) **Explosion-safe PCM-remote control system with double-ring circuit for mining application.** Schauer, R. 1982. (In German). NTIS (US Sales Only), PC A18/MF A01.

From 6. conference on telemetry; Garmisch-Partenkirchen, F.R. Germany (10 May 1982).

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The remote control system PUCAM 100 has been operating since 1980. This system was developed for mining because there was an increased need of information about the more and more complicated, expensive machinery for large chambers in underground mining. The project was, subsidized by the Federal Ministry for Research and Technology (FRG) within the framework of a research project.

31109 **(DOE/FE/16126—2) Hydraulic borehole mining for pitching coal seams. Final report.** Knoke, G.S.; Scott, L.E.; Archibald, W.R. (Flow Industries, Inc., Kent, WA (USA). Research and Technology Div.). Jul 1982. Contract AC01-81FE16126. 157p. NTIS, PC A08/MF A01. Order Number DE83001405.

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This project was undertaken to extend the vertical borehole mining concept to the new tool configurations needed to economically mine pitching coal seams. The objective was to determine the optimum borehole mining plan and system for mining coal seams less than 10 feet thick that pitch more than 25 degrees. Of the methods considered, the double-drill method was selected for further study. This method uses a larger vertical hole for the pumping tool and a smaller slant hole for the cutting tool. The slanted cutting hole is drilled down-the-dip on the footwall of the seam to intersect the vertical hole at maximum depth. The cuttings thus drain down the cutting hole to its intersection with the pumping hole, from which they are pumped to the surface. Detailed engineering efforts demonstrated double-drill method technical feasibility and performance capabilities. However, these efforts also revealed two items that require further development: (1) the borehole slurry pump and (2) the means to ensure vertical and slant borehole intersection. Recommendations as to the type of equipments needed and the effort required to develop them for this application are given. Detailed economic studies of the double-drill method were conducted. These studies indicated that this method has a very favorable economic potential, i.e., potential internal rates of return of about 50 percent per year.This implies that pitching coal seams could be mined more profitably using this method than can level coal seams using conventional underground mining method. Based on the success of this project, it is expected that double-drill hydraulic borehole mining will prove to be a valuable tool for recovering pitching coal resources if its development is continued.

31110 (DOE/PC/20091—T1, pp 17p, Sect.4) **Computer simulation of surface coal mining by dragline.** White G.P.; Jones, J.M.; Neisz, J.H.; Reeves, R.M.; Austiff, P.L. (Southern Illinois Univ., Carbondale). Aug 1982. NTIS, PC A14/MF A01.

In Special Research Service agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982.

Over the past ten years, the U.S. government has funded several projects to develop computer simulation models for surface coal mining. These projects have produced a number of computer programs which, because they were developed through government funds, are available to the general public. However, the adoption of these programs by the mining industry has not been widespread. This is partly because very little is generally known about these programs and partly because each program was developed for a specific computer. Under a grant from the U.S. Department of Energy, the authors have obtained six of these currently available simulation programs, all of which involve dragline operations. These programs have been modified, as necessary, to run on an IBM 370 computer and have been extensively evaluated and compared to determine their potential usefulness in the mining industry. We describe the six currently-available dragline simulation programs, their applicability to different uses and the results of sensitivity testing performed on the models. The results are summarized in Tables 1, 2, and 3. The computer models examined represent the first generation of dragline simulation programs useful as planning and research tools. The next step in the application of computer technology to surface coal mining will include further validation of the models by relating them to actual mine situations; refinement of the programs themselves to make them better suited to the needs of a mine manager or planner; and development of a second generation of models that will be even more useful than those already in existence.

31111 (DOE/PC/20091—T1, pp 27p, Sect.6) **Development of a conceptual design of a subsidence data bank.** Yarbrough, R.; Pocreva, R.; Verrecchia, S. (Southern Illinois Univ., Carbondale). Aug 1982. NTIS, PC A14/MF A01.

In Special research Service Agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982.

The timing of this contract could not have been worse considering the present situation of federal and state regulations concerning mine subsidence. Much of the industry is not interested in discussing their needs at this time, nor are they interested in discussing with anyone their present plans to meet the requirements of OSM regulations. The many court suits evolving from the industry, concerning the Act and the regulations, have left the industry in a very guarded mood concerning their future plans and their partici-

pation in any type of a National Mine Subsidence Data Bank. It is the author's opinion tht the new OSM regulations, when released, will in themselves provide a good data base for a Mine subsidence Data Bank at the national level. Either the interviewers were not able to successfully interview the coal companies who mine most of the coal in this country or, if an interview was conducted, only minimal information was gathered. Several coal company executives did discuss in an informal nature that a data bank at a regional level might be useful to them in the future in meeting the OSM regulations no matter what form they take and also would be most useful if they were to plan new mines in a coal field in which their staff was unfamiliar.

31112 **(DOE/PC/20091—T1) Special Research Service agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982.** (Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center). 1982. Contract AC22-79PC20091. 304p. NTIS, PC A14/MF A01. Order Number DE83009192.

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Projects were specified by CMTC to satisfy specific research, demonstration, and development needs. They covered the following activities: (1) the relationship of man and machine; (2) the phenomena of hydraulic fragmentation and transport; (3) economic studies of productivity in the strip-mining of coal; (4) computer simulation of surface coal mining by draglines; (5) a study on pyrite sizing and petrographic analysis; (6) the conceptual design of a subsidence data bank; and energy audit including a heating and cooling analysis for the CMTC Administration Building. All six numbered items have been entered individually into EDB and ERA. (LTN)

31113 (DOE/PC/20091—T1, pp 45p, Sect.1) **Man-machine mining system.** Lindsey, J.F.; ; Pitz, G.F. (Southern Illinois Univ., Carbondale). 1982. NTIS, PC A14/MF A01.

In Special Research Service agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982.

The Dragline Training System has been developed by McDonnell-Douglas Electronics Company. It creates the environmental conditions usually encountered at a midwestern U.S. surface mine using large walking draglines. A 50:1 scaled dragline model simulates a Bucyrus-Erie 1370 machine, which is positioned in a model mine. A TV-model simulation technique is used in which a television in full scale into a large screen (8' x 8') in front of the operator, seated in a full-size cab at Bucyrus-Erie controls. The operator can operate the model dragline by manipulating the controls and observing the reaction on the television display. The dragline model contians servo-controlled functions for hoist, drag, swing, delta swing, and longitudinal and lateral positions. The delta swing provides bucket lag during swing and a pendulum action when the swing is terminated. A 46-m^3 bucket is simulated. The mine is simulated by a 4.5 x 5.5-m section containing dirtlike material that provides bench, pit, and spoiling area of a strip mine. The pit can be arranged in differnet ways so that the trainee can practice such tasks as benching, chop down, key cut, set removal, face digging, and spoiling. The being used, and also makes it possible for the operator to perform both clockwise and counterclockwise dig-to-spoil swings. A sound system composed of a microphone placed in the dragline model gives the operator a sense of power application normally evident from the sounds of responding motors. Additional cues on the dragline's malfunctions are also included on an annunciator panel.

31114 (DOE/PC/20091—T1, pp 35p, Sect.2) **Hydraulic fragmentation and transport.** Evers, J.L.; Eddingfield, D.L. (Southern Illinois Univ., Carbondale). 1982. NTIS, PC A14/MF A01.

In Special Research Service agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982.

A theoretical model has been developed that describes the pressurization of a capillary by a sweeping water jet. The dead-end capillary model agrees with the experimental results within predictable tolerances over the range of parameters utilized in this investigation. The gas-release model is still being refined. Experimental results and the theory have been used to show that pressure magnifications can be maximized by finding the proper traverse rate for a particular capillary diameter and length. As the tube gets smaller and longer the potential for large magnifications decreases. For example, the smallest tube theoretically modeled in this investigation (diameter = 0.008 in., length = 1.5 in.) indicated a maximum pressure magnification of only 3.5 for a centerline pressure of 400 psi and a traverse rate of 20 ft/sec. For cavity dimensions in the micro-fracture range, this mechanism of producing large internal hydraulic pressure pulses does not appear to be very promising. However, for the large micro-fracture in which gas can be trapped or partially trapped, pressure pulses can be produced by a sweeping jet that exceed the impact pressure by orders of magnitude. It is anticipated that this model can be used for future studies in which additional features of a porous matrix such as tortuosity and interconnectivity are added.

31115 (DOE/PC/20091—T1, pp 20p, Sect.3) **Productivity in the strip-mining of coal.** Mayers, J.G.; Fare, R. (Southern Illinois Univ., Carbondale). 1982. NTIS, PC A14/MF A01.

In Special Research Service agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982.

Data on ouput and eight inputs were assembled for a sample of 15 Illinois strip mines from government reports and private communications with coal mining companies. The inputs are labor, three types of machinery, and four measures of geological conditions. The data are shown in Table 4-1 and the results of the mesurement process in Table 4-2. All mines were found to be technically efficient, indicating that production occurred on the isoquant. Further, only one case of congestion was found. The major source of inefficient production in the sample was due to deviations from optimal scale; 6 of the 15 mines in the sample, all middle-sized, were below optimal scale. The application illustrates the application of the efficiency measurement method developed in this study. The meaningfulness of the results is limited because of the small size of the sample. Feasibility has demonstrated, however, and application to a larger sample will bring more substantive results.

31116 **(ECE/COAL—75) Use of mini-computers for the monitoring and control of all mining sub-systems and for the collection of data needed for management control.** (Economic Commission for Europe, New York (USA)). 30 Nov 1982. 7p. Economic Commission for Europe, New York, NY.

This paper discusses the impact of mini-computers on the monitoring and control of mining operations and of coal preparation. The availability of low cost, low powered microprocessors is stressed and the subsequent effects on the design of equipment and of computer systems are considered. Several examples of computer controlled operations are mentioned, from the United Kingdom, the Federal Republic of Germany, and Poland. The use of computers in management decision making is considered.

31117 **(EUR—7848-FR) Effect of depth and environmental factors on mine workings.** George, L.; Piguet, J.P. (Commission of the European Communities, Luxembourg). 1982. 50p. (In French). Commission of the European Communities, Luxembourg.

Special equipment and operating techniques have been developed to measure the initial stress in rocks. A method of recreating the overall stress tensor for the working has been found. It operates by optimizing the initial situation of the workings via a digital finite-element calculation so that calculated stresses around a roadway with the same layout as the actual roadway are as close as possible to the measured stresses. The method was applied to the coal mines in the Houilleres de Lorraine and Houilleres de Provence areas. Increased depth has an adverse effect on the behaviour of workings, but, in the cases studied, it was not the decisive factor. It was found that stress and strain measurements need to be combined with an accurate analysis of the geological structure in order to predict rock bursts etc. (In French)

31118 **(NCSR-R—28) Reliability assessment of a triggered coal dust explosion barrier.** Howard, S. (National Centre of Systems Reliability, Culcheth (UK)). May 1982. 30p. National Centre of Systems Reliability, Culcheth, England.

The results of a detailed assessment made on a coal dust explosion barrier in order to find its probability of failure on demand

and spurious tripping rate are described. The barrier consisted of two parts, the sensor and the disperser, separated by a predetermined distance and connected together by an armoured cable. The sensor consisted of two thermocouples, which when heated by an explosion flame, actuated the water disperser which produced a high pressure water curtain.

31119 **(NP—3900969) Seventy-five years Bavarian brown coal industry (1906-1981).** (Bayerische Braunkohlen-Industrie A.G., Schwandorf (Germany, F.R.)). 1981. 102p. (In German). NTIS (US Sales Only), MF A01. Order Number DE83900969.

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This publication to the 75 year jubilee of the Bavarian brown coal industry (BBI) contains a complete retrospect on the development from its beginnings until the impending stoppage because of the deposit's exhaustion.

31120 **(NP—3901294) Driving a wedge-shaped chisel into a rock - experimental and theoretical studies.** Weustenfeld, H. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen). 12 Dec 1980. 115p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901294.

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The study investigates the possibility of maximum rock crushing effect at minimum energy supply using an impact rammer. The force between chisel and rock is determined in dependence of the penetration length for various impact energies. The results were validated by computer codes.

31121 **(ORAU—211) R and D technological change in coal mining.** Baker, J.G. (Oak Ridge Associated Universities, Inc., TN (USA)). Feb 1983. Contract AC05-76OR00033. 61p. NTIS, PC A04/MF A01. Order Number DE83011210.

This study examines the issue of R and D and technological change in coal mining, focusing on the period 1970 to present. First, a conceptual framework for classification of coal-related R and D and technological change is developed. This is followed by a review of literature related to technological change in coal mining and related areas. Several measures of technological change are examined. Evidence concerning R and D expenditures and employment of technical manpower in coal mining is reviewed. Direct measures of technological change (i.e., labor productivity, production functions, and total factor productivity) are examined. Determinants of technological change in coal mining (e.g., industry structure, long term contracts, firm resources, etc.) are discussed. The impacts of the 1981 Economic Recovery Tax Act on coal-industry R and D and technological change are examined. The study also contains a summary of information received from the research directors of nine mining-machine manufacturers. Perhaps one of the most important factors in encouraging coal industry R and D and innovation is a healthy, sustained rate of growth in the economy in general and the coal industry in particular. A healthy economy with lowered rates of inflation and interest would lower uncertainty, provide a financial base for R and D efforts, and encourage investment and vendor-related R and D. These benefits, tied to the effects of ERTA, would result in growth in coal industry R and D. Even with sustained economic performance, the coal industry is unlikely to undertake innovative R and D because of industry characteristics that are unaffected by economic variables; i.e., variability of seam conditions, lack of benefits to first-time innovators, the timing of revenues and expenditures over the life cycle of a mine, and the inability of R and D to build new markets (unlike R and I) in electronics).

31122 **(PB—83-148023) Design criteria for sheathed permissible explosive charge for open shooting in flammable atmospheres. Report of investigations/1982.** Mainiero, R.J.; Hay, J.E. (Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center). Oct 1982. 18p. NTIS, PC A02/MF A01.

The Bureau of Mines conducted research to evaluate the optimum design for a rock-breaking explosive charge that could be fired unconfined in a gassy or dusty coal mine without the danger of igniting the flammable atmosphere. Charges of various shapes, with and without cavities, were tested in a gallery using 3-by 3- by 1-ft concrete blocks as simulated boulders. For these tests the optimum charge, in terms of cost, weight, and convenience in handling, consisted of a flat 1-1/2-lb charge of permissible explosive seven-eighths of an inch thick and 7 in. in diameter encased in a 1/2-in thick layer of fine salt (NaCl). This work demonstrated that it should be possible to produce an inexpensive explosive rock-breaker charge that would be safe to use in underground coal mines.

31123 **(PB—83-149070) Application of the dedicated wire technique to improve coal mine trolley carrier phone communications. Open file report Nov 79-Dec 81.** Lagace, R.L.; Spencer, R.H. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Dec 1981. 80p. NTIS, PC A05/MF A01.

A whole-mine experiment to assess the practical feasibility and utility of the dedicated-wire technique to overcome poor trolley carrier phone system performance at a large underground coal mine was designed, performed, and evaluated. The technique involves the use of a single, low-loss, properly terminated, and branched auxiliary wire placed in the rail haulageway. This auxiliary dedicated wire allows signals to electromagnetically couple to the trolley wire-rail transmission line and thereby significantly decrease the overall signal attenuation rate on the trolley wire-rail line. The in-mine dedicated-wire demonstration program and its results, conclusions, and recommendations are described.

31124 **(PB—83-152223) Methodology for hydrologic evaluation of a potential surface mine: Loblolly branch basin, Tuscaloosa County, Alabama. Water-resources investigations (final) 1975-81.** Shown, L.M.; Frickel, D.G.; Miller, R.F.; Branson, F.A. (Geological Survey, Denver, CO (USA). Water Resources Div.). Sep 1982. 103p. NTIS, PC A06/MF A01.

Methodology for evaluation of premining hydrology and postmining effects and reclamation on the hydrology of an area is presented for a potential mine site in northwestern Alabama. Estimation techniques and extrapolation are used to develop data for reconstructed topography, soil-water relations, peak flows, flow volumes, soil losses, and sediment yields. Streamflow response of the basin is described by the variable-source-area concept; nearly all water flows through coarse-textured soils and unconsolidated sand and gravel deposits that are underlain by an impermeable clay zone. The resultant peak discharges are small to moderate, and there is very little erosion of slopes or channels. Susceptibility of the soils to compaction by heavy machines and the effects of compaction on soil-water relations are demonstrated.

31125 **(SAND—82-2939C) Optimization of rock-cutting tools used in coal mining.** Ford, L.M.; Friedman, M. (Sandia National Labs., Albuquerque, NM (USA); Texas A and M Univ., College Station (USA). Coll. of Geosciences). 1983. Contract AC04-76DP00789. 15p. (CONF-830605—3). NTIS, PC A02/MF A01. Order Number DE83008207.

From 24. symposium on rock mechanics; College Station, TX, USA (20 Jun 1983).

Analytical, experimental, and observational studies have been conducted to gain a fundamental understanding of tool/rock interactions. This will allow optimization of designs for depth-of-cut, tool-spacing, kerfing, and water-jet assistance. Equations are developed that show optimum tool-spacing reduces cutting forces to nearly 50% of what a single tool requires; experimental data shows optimized kerf-depth reduces cutting forces 30% and increases volume of rock removed by a factor of about 2 or 3, thus decreasing the specific energy (compared to a single tool) by as much as 75%. Unconfined blocks of Tennessee Sandstone and Carthage Limestone were systematically grooved at depths-of-cut from 0.025 to 0.100 in. (.635 mm to 2.54 mm) with a flattened Austin AP24 Cutter while horizontal and vertical cutting forces are measured. Cutting force divided by depth-of-cut decreases with increasing depth-of-cut while cutting force divided by cross-sectional area of rock removed decreases with increasing depth-of-cut until about 0.080 in. (2.032 mm) and then increases. Water saturation reduces cutting forces by nearly 50% through lubrication and rock-strength degradation. Overall results suggest water-jet kerfing on either side

of each tool could achieve 75% or more reduction in specific energy compared to a single tool. This would increase tool life, lower dust production and methane ignition probabilities, reduce equipment and maintenance costs, and allow inceasing production at lower per ton costs. Water-jet assistance ahead of the tool to increase macrofracturing also would decrease specific energy requirements.

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REFER ALSO TO CITATION(S) 31107, 31112, 31116, 31119, 31157, 31158

31126 (ANL—82-62, pp 50-64) **Performance characteristics of a capacitive mass flowmeter on the ANL solids/gas flow test facility.** Bobis, J.P.; Brewer, W.E.; McQuinn, J.R.; O'Fallon, N.M.; Armani, R.j. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper describes the Argonne National Laboratory Solids/Gas Flow Test Facility (S/FGTF) and presents the results of the measurement of mass flow with the capacitive flowmeter at S/GFTF. The capacitive flowmeter velocity measurements are compared with the gas velocity. The flowmeter's combined density/velocity measurements, which yield the mass flowrates, are compard with the time rate of change of the S/GFTF hopper weight. For the different flow tests, instrumentation accurately monitored the air flowrate/temperature and the mass flowrate of the predominant 1-2 mm diameter limestone exiting and entering the hop[er. The gas flowrate ranged from 150 to 350 CFM when operating at 20°C and near atmospheric conditions. The solid flowrate ranged from 0.3 to 3.0 lbs/sec as measured by hopper load cells and monitored with the data acquisition system.

31127 (ANL—82-62, pp 65-76) **Real time velocity measurements of airborne solids flow with an industrial correlation flowmeter.** Murphy, T.E. (Sybron/Taylor, Inc., Rochester, NY); Post, M.J.; Bobis, J.; Farley, H.L. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Flow velocity measurements of airborne limestone particles were made in the range of 65 to 110 ft/sec with mass flows in the range of 0.2 to 0.7 pounds/sec. Measurements were made on the Argonne Solids/Gas Test Flow Facility using the Argonne experimental capacitive sensors. Flow rates were computed by the Taylor Industrial Correlation Flowmeter to provide real time velocity measurements. The real time velocity results are compared to differential pressure and commercial research-type correlation velocity estimates.

31128 (ANL—82-62, pp 77-85) **Mass flow measurements of gas-solids suspensions using venturimeters with light attenuation.** Payne, A.; Werner, M.; Plank, D.; Crowe, C.T. (Washington State Univ., Pullman). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Two independent measurements are needed to measure the flow rate of each phase in gas-solids mixtures. With the gas-solids flow through a venturi, two such measurements are the pressure drop between the pipe and throat and the attenuation of light across the flowing mixture. This technique is viable if the particle size is known. Another approach is the measurement of pipe-throat pressure drop and the total pressure drop across the ventiru. This technique is valid for Stokes number exceeding seven and is independent of particle size.

31129 (ANL—82-62, pp 145-152) **Factors affecting the adhesion of coal particles to oil-coated air bubbles.** Khan, L.A.; Kruse, C.W. (Illinois State Geological Survey, Champaign). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

In oil agglomeration, the selective wetting of coal by a sufficient quantity of a liquid petroleum product, such as gasoline, kerosene, or fuel oil, is used to selectively agglomerate the fine coal particles into a mass large enough to stay suspended on a screen that allows the fine gangue particles to pass through. An oil which is efficient with respect to selective wetting of coal is not necessarily the best for producing a strong agglomerate. It may be better to collect the coal with lighter oils and then use heavier oils to complete the formation of a structure strong enough for screening. The efficiency of the collecting process can be increased with respect to the amount of oil needed if the oil is dispersed in water before contacting it with the coal. If the blending of oil and water is vigorous, an emulsion results having a larger volume than that of the components. This increase in volume is caused by the entrapment of air. The coated air bubbles that are formed exhibit the surface properties of oil globules but they are much lighter, and consequently they rise and cream out. When this oil/water emulsion is mixed with a coal-water slurry, the coal particles collect on the coating around the air bubbles and are buoyed to the surface where they can be removed by skimming. Successful collection of coal by the pregenerated emulsion (or foam) requires first that coal particles be brought into contact with oil surfaces around the air bubbles and secondly that the coal particles attach to these surfaces. The frequency of collisions between the oil and coal particles is determined among other factors by the number of coal particles, the number of air bubbles, and the distance between them. The present paper examines this process in detail.

31130 (ANL—82-62, pp 198-205) **Online correlation computer for noninvasive mass flowrate measurement in ducts.** Lenkszus, F.; Porges, K. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The technique of flow velocity measurement by correlation of the readout delivered by paired sensors has been known for 40 years and repeatedly demonstrated, with a number of sensor types, in homogeneous and two-phase flow. Hardware correlators based on parity correlation have been designed in several laboratories; more recently, parity correlator chip circuits have come on the market. However, to obtain a reading of the mass flowrate in multiphase flow, the velocity readout must still be combined with a determination of the medium density. To accomplish this task, a microprocessor system is indicated, which then can also provide data display and storage, flow stoppage warning, and similar programmable functions. With recent advances in microprocessor speed and price reductions, it has become practical to dispense with the hardware parity correlator and implement a fully functional covariance computer and peak locator, using commercial chip and board hardware in lieu of special chips and boards. This considerably improves reliability and accuracy of the velocity measurement while bringing down the cost. A prototype unit is described that can employ acoustic or radiation beam transmission, dielectric or conductivity sensor pairs for the velocity measurement, as well as any of these sensors for the medium density measurement, and delivers a mass flowrate readout at 0.1-2 second intervals. The system is based on an 8086/8087 microprocessor board, an analog-to-digital conversion board, and a bit-slice (2900) high-speed computing board that incorporates a Multiplier-Accumulator chip. The 8087 can be programmed in high -level language, allowing program improvements, with a standard commercial development system; a number of somewhat different programs, specifically designed for some flowmeter task and installation site, can thus be provided in EPROM, as plug-in chips or cards.

31131 (ANL—82-62, pp 206-225) **Development of neutronic mass flow meter.** Gozani, T.; Esterl, J.; Goodman, J.; Bernatowicz, H. (Science Applications, Inc., Palo Alto, CA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The development of a truely non-intrusive neutronic mass flow meter for measurement of mass flow rates in very harsh environments such as exist at coal liquefaction plants is described. The state-of-the-art in the 14 MeV two-phase flow measurements is briefly reviewed, along with the principles of the measurement techniques. A conceptual system is discussed delineating all its main

components. A theoretical model is developed that allows analysis of the experimental data and extrapolation to plant conditions. The results of experiments performed using a liquid/solid loop are described. These experiments demonstrated that two-phase flow velocities can be readily measured to precisions better than 1% using commercially available and reliable components. The experimental portion of this investigation covered many topics to define uncertain effects, substantiate assumptions, and corroborate calculations in order to optimize a prototype neutronic mass flow meter. Gamma ray spectra of various materials, irradiated under different conditions, were obtained in two types of detectors. Several different velocity measurements were taken over a factor of 10 range in velocity. Very high precision was obtained for the velocity determinations. The irradiation (activation) profile of the neutron generator was investigated. The effects of collimation and absorbers on the detectors were determined. Steady state experiments determined that silicon is detectable under realistic conditions. A brief discussion of the results of the various measurements is given.

31132 (ANL—82-62, pp 226-232) **Some recent slurry flow measurements with SLTF.** Porges, K.G.; Kampschoer, C.; Cox, S.A.; Brewer, W.E. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The Slurry Loop Test Facility was designed to provide a set of three independent measurements from which the liquid and solid mean flow speed, as well as the effective solid volume fraction in the medium, can be computed. This further yields a measurement of the solid transport rate, as well as the slip velocity of the solid with respect to the liquid velocity, in slurries featuring large solid grain size and/or low viscosity liquid, as found in many coal transport and utilization plants and facilities. Inasmuch as the solid delivery rate, rather than total mass flowrate, is the variable whose measurement is needed to optimize operation of such facilities, these measurements are intended to provide calibration for various mass flowmeters that can be installed in either a vertical or a horizontal leg of the loop. The measurement cycle includes a direct mass flowrate measurement by timed diversion of the mainflow into a weighing tank, then a volumetric flowrate measurement in a level-sensing standpipe and, finally, a measurement of the solid component velocity by Pulsed Neutron Activation. In conjunction with analysis of the solid in terms of oxygen content, which makes use of the same neutron generator deployed on the loop, the solid feedrate can alternatively be determined by exploiting both the intensity and time rate of the observed PNA signal. Preliminary data show velocity slip for a range of medium velocities, as well as for different solid volume fractions. Considerably more data, for different types and grain size of solids, will be needed to develop a semi-empirical model, now lacking, of this practically important parameter.

31133 (ANL—82-62, pp 447-454) **Improved efficiency in coal preparation circuits.** Mackinnon, M.N. (Kay-Ray, Inc., Arlington Heights, IL); Robertson, G.W. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The most important parameter to be maintained in a coal preparation plant is the specific gravity of the plant's circuits. The closer each circuit can be kept to its set specific gravity, the more profitable the preparation plant will be. This profitability can mean anything from additional coal yield to a more efficient refuge thickener line. A large coal preparation plant may need to monitor specific gravity in more than a dozen locations: heavy media lines, magnetite thickener underflows, refuge thickener underflow, froth flotation feeds, and cyclone circuits. The most common application for a specific gravity sensor is the monitoring of the feed to a heavy media washer. The float-sink data from a washability study will show where the specific gravity should be kept in the heavy media vessel. A variance of even 0.001 SGU from the set specific gravity, or cut-point, can cause a significant loss in coal yield or coal quality. This is why a highly accurate specific gravity sensor is imperative in a coal preparation plant. In April 1982, a coal preparation plant in West Virginia retrofitted five Kay-Ray systems in place of differential pressure cells. From circle chart recorder data before and after this retrofit it is readily apparent how much more accurate the Kay-Ray was than the DP cell. The end result of using a more reliable, accurate, low maintenance density sensor is an increase in clean coal yield. A 3% yield increase has been found to be a conservative average. At current coal prices, an average preparation plant of 600 TPH could expect to produce $1,080,000 more coal with this 3% increase in yield. The Kay-Ray sensor only requires a fraction of the maintenance necessary with a DP cell.

31134 (ANL—82-62, pp 634-642) **Coal/stone monitoring using two energy gamma transmission.** Wykes, J.S.; Croke, G.M. (National Coal Board, Burton-on-Trent, England). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The principle of using two gamma ray beams of different energies in the analysis of coal/stone mixtures is described. This technique has been developed in order to monitor run-of-mine coal on a conveyor belt and a prototype device has been built by Marconi Space and Defence Systems Ltd. A method of determining the stone content of a coal/stone mixture consists of measuring the uncollided flux transmitted through the mixture from two gamma ray sources of different energy. As only the uncollided flux is measured, the method is independent of the spatial distribution of the two components in the mixture. For best results, the gamma-ray energies should be chosen such that at one of them the absorption coefficients of the coal and stone are almost equal while at the other, there should be a substantial difference between them. Choosing the energies in this way means that one of the expressions for the mass loading will exhibit only a small dependence on the stone content. It should also be borne in mind that low energy radiation is easily absorbed by minerals and this could limit the maximum mineral loading which can be usefully analysed. At the other end of the energy scale, gamma-ray beams are less readily absorbed in passing through large amounts of mineral and hence the sensitivity to changes in mass loading will be poor. One choice of energies which satisfies all of these constraints is 60keV radiation from Am^{241} and 662 keV radiation from Cs^{137}. A schematic diagram of a prototype device operating on the above principle is shown in Figure 1. The problems encountered during the development of this instrument are described under the following headings: downscatter and background interference, randomly varying loads and counting losses due to pulse pile-up.

31135 (DOE/FC—TH-1) **Hot-water drying of a lignite slurry in water.** Maas, D.J. (North Dakota Univ., Grand Forks (USA)). May 1983. 198p. NTIS, PC A09/MF A01. Order Number DE83010811.

Removal of moisture from lignite was studied by heating North Dakota lignite in water slurry 200° to 285°C using -100 to +140 US mesh particles in three different slurry concentrations (weight solid-to-liquid ratios) of 1/1, 2/1, and 3/1. The lignite containing 33% inherent moisture, was heated in an autoclave, held at the drying temperature for 15 minutes, and then cooled to room temperature. Residual gas obtained was collected and analyzed. The slurry was then removed and filtered to determine final moisture content of the coal. The content of various metals was determined. Selected lignite samples were analyzed for total acidic groups, gross heating value, and ash content. Ultimate analysis was conducted on five of the product lignite samples. The slurry concentration was shown to not significantly affect moisture reduction. Moisture reduction, which ranged from 25 to 75%, varied linearly with drying temperature according to the empirical equation given in the temperature range studied. An empirical equation was also determined for calculating the final moisture content of a coal after hot water drying. Ash content did not change significantly but sodium content of the lignite was reduced during hot water drying. As the drying temperature increased carbon dioxide formation, gross heating value, and acid group decomposition increased. The equilibrium moisture content of a hot water dried lignite decreased as the drying temperature increased. Hot water dried lignite showed a 6 wt % increase in moisture content in moisture reabsorption tests.

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REFER ALSO TO CITATION(S) 31060, 31591, 31601, 31921

31136 (ANL—82-62, pp 161-168) **Thermometry in coal utilization.** Schooley, J.F. (National Bureau of Standards, Washington, DC). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

In this paper, we have illustrated some of the common problems that exist in thermocouple thermometry, still the workhorse for temperature measurements in coal utilization, as well as some of the progress in this time-tested technique. Furthermore, we have mentioned other contact and radiation methods that are available for these measurements, in the earnest hope of providing some guidance for innovation in thermometry for coal utilization experiments and development.

31137 (ANL—82-62, pp 169-181) **Combustor pinhole camera.** Witte, A.B.; Gat, N.; Cohen, L.M. (TRW Space and Technology Group, Redondo Beach, CA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Aerodynamic window and pinhole camera concepts were combined in developing a novel gas purged port to view high pressure combustion phenomena. Whereas gas purge requirements were only about 10 percent of that needed for conventional access ports, thereby minimizing flow disturbances, the window was kept free of combustion debris for hours of real-time video observation in the TRW 20MW MHD Coal Combustor. The pinhole camera has been used mainly to record slag motion on combustor walls and to observe interesting coal sheet ignition phenomena. These observations, recorded on video tape as well as displayed in real time, were used to improve our understanding of basic phenomena, operating conditions and performance. The concept has also been used for clean access while making spectroscopic measurements.

31138 (ANL—82-62, pp 338-347) **Nonlinear dynamic model of the TVA 20-MW AFBC pilot plant.** Sumaria, V. (JAYCOR, Woburn, MA); Kalnitsky, K.C.; Byrd, J.R. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

A transient model of the TVA 20-MW atmospheric fluidized bed combustion (AFBC) pilot plant is being developed to provide a basis for: (1) understanding interactive process dynamics, (2) verifying design parameters, (3) predicting effects of subsystem changes on the entire process, (4) evaluating overall system (process and controller) performance, (5) evaluating alternate philosophies, and (6) designing multivariable controllers.

31139 (ANL—82-62, pp 407-414) **Microwave bed-level detectors.** DeLauder, D.M.; Balanis, C.A. (West Virginia Univ., Morgantown). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper describes the design, testing, and evaluation of two candidate microwave systems for detection of bed-levels in fluidized-bed combustors. While both systems are microwave radars, two different schemes of operation are used: frequency-modulated continuous wave (FM-CW) and short-pulse time-domain methods. Testing was performed in a laboratory environment on static targets of metal, limestone, and coal.

31140 (ANL—82-62, pp 509-521) **Control of industrial fluidized bed boiler plant.** Virr, M.J. (Johnston Boiler Co., Ferrysburg, MI). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The control systems described have basically been of the electrical/pneumatic boiler type which is largely conventional. However, the control systems lend themselves admirable to a micro-computer controller, and we now have a project underway to incorporate such a device both on the demonstration firetube FBC boiler in our plant and on an overseas installation of one of the watertube boilers now that the control arrangement has been proven with conventional control technology. Boiler tests on both these types have indicated that efficiencies of 80 percent or over are achieved on full-load, and the carbon and ash losses are of the order of 5 percent or less. Load response is excellent for both boiler types with loads in the order of 30 to 40 percent being instantaneously met with the control system described. As the excess air is controlled throughout the load range at a relatively low figure, excellent part-load efficiencies are achieved and figures as high as 79 percent have been confirmed during tests at half-load. Where fuel supplies have become questionable, industrial plants require insurance against lack of supply of any single fuel and this a fluidized bed boiler can assure, the controls being arranged so that only a flick of a switch is necessary. At the same time, they must meet EPA and local regulations covering emissions. This has led to the rapid acceptance of fluidized bed boilers over the last two years. This is illustrated by some 34 orders we have received; 14 of these plants are already in service. These units can not only burn high sulfur coal to within EPA standards but can also have separate feeders for conveying waste materials into the fluid bed to be burned as makeup fuel. The watertube boilers are adaptable to high pressures and cogeneration systems and, therefore, can be expected to meet a wide variety of industrial needs in the coming years.

31141 (ANL—82-62, pp 522-529) **Process control of multi-solid fluidized bed combustion.** Gangaram, G. (Battelle Columbus Labs., OH); Litt, R.D.; Seber, E.C. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The Multi-Solid Fluidized Bed Combustion (MSFBC) is gaining commercial acceptance because of its outstanding performance and versatility. Combustion and heat exchange take place in separate units so that each can be optimized without adversely affecting the other's operation. Fuel is burned in the combustor while heat exchange is accomplished in the External Heat Exchanger (EHE) and the convection section which are external to the combustor. This decoupling is accomplished by the circulation of a bed of fine solids consisting of sand, limestone, and ash between the combustor and the EHE. This arrangement facilitates: (1) control of combustor temperature and (2) transfer of heat in a mildly fluidized bed heat exchanger. The former assures high carbon combustion efficiency, high sulfur capture and low NO/sub x/ emissions; the latter assures a high heat transfer coefficient and minimal tube erosion. A bed of large fluidized solids, referred to as the dense bed, located at the bottom of the combustor above the air distributor increases the residence time of the circulating solids, promotes more gas-solids and solids-solids contact, improves carbon combustion efficiency, enhance sulfur capture, and facilitates above bed feeding. The large particles in the dense bed stabilize a bed of the fine particles at superficial velocities far above their entrainment velocity. The optimum interaction of dense bed and entrained bed leads to the excellent performance obtained while operating at higher velocities than would otherwise be possible. The control features are: steam quality analysis, combustor temperature control, solids circulation control, and operator initiated automatic turndown capability.

31142 (ANL—82-62, pp 530-539) **Control system requirements for the 20 MW EPRI/TVA fluid bed demonstration unit.** Dixon, R.R. (Babcock and Wilcox Co., Lynchburg, VA); Dziubakowski, D.J. Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The results of a preliminary review of process requirements for the TVA 20-MW AFBC pilot plant are presented. Many of the pilot plant control requirements are based on experience with conventional boilers, test results of a smaller experimental unit at B and W's Alliance Research Center, or on a theoretical understanding of process dynamics. The objective of the preliminary review was to provide a fundamental understanding of control requirements. These basic level requirements provide a means of developing an

analytical cost function which can be used to evaluate control system performance. The scope of interest is limited to multivariable interactions within the boiler during on-line operations. The requirements are summarized in Table 1. A control system design should address and attempt to satisfy each requirment, but it is important to notice that conflicts will occur. For example, if load is changed by changing bed temperature, this will conflict with the optimum bed temperature for sulphur removal. Changing bed temperature will also change superheater absorption and upset steam temperature. Hence, the individual control requirements must be compromised to achieve the best total system performance possible. By understanding the source of the control requirements, each requirement can be properly weighted. This collection of weighted control requirements becomes the basis for measuring the performance of alternative control system designs. As testing on the pilot plant progresses, the interaction between process variables will be quantified. this will lead to a better understanding of the controllability of the AFBC process and a better dynamic performance from commercial full scale plant.

31143 (ANL—82-62, pp 548-570) **Characterization of aerosols in low-Btu product gas and combustion process streams.** Anderson, R.J.; Kovach, J.J.; Grimm, U.; Mapstone, J.O. Jr. (Morgantown Energy Technology Center, WV). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Loadings of (Products of Combustion) POC aerosols from both burners (a 6 million Btu/h combustor and a small stainless steel laboratory burner) were increased over the previous gasifier run. Chemical analyses of POC aerosol samples indicated that the majority of the aerosols were composed of sulfur or sulfur compounds. Increased levels of H_2S in the producer gas resulting from bypassing the sulfur removal unit were believed primarily responsible for the higher POC aerosol loadings of this run. While some contribution to the dynamic burner's POC aerosol loading was anticipated to be caused by degradation of the refractory liner, chemical analyses did not detect significant quantities of refractory in the aerosol samples. Aerosol mass loadings of the producter gas were found to be about an order of magnitude greater than those found during the previous run. This increase was attributed to the presence of particles usually removed from the process stream by the sulfur cleanup system. These producer gas aerosols contained some traces of sulfur, chlorine, and ferric compounds but were primarily composed of water and dissolved organic compounds. Since no carbon was detected in the POC aerosols, the producer gas aerosols had no apparent influence upon the POC aerosol loading (i.e., soot formation). In three separate studies of the combustion of low-Btu gas, the gasifier and cleanup train have undergone numerous physical as well as operational modifications (i.e., various coals have been used and the system has been operated with and without the sulfur removal system). Our studies of both the producer gas and the POC of this gas indicate that the single most important parameter in determining the level of contaminants in the producer gas is the operation of the cleanup system. The most significant contaminant, in terms of POC aerosol formation, is sulfur or H_2S.

31144 (ANL—82-62, pp 580-586) **Atomization of coal-methanol slurries.** Kim, S.J.; Crow, E.; Crowe, C.T. (Washington State Univ., Pullman). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

A promising means is the direct mixing of solid coal particles with liquid fuels. By this means, the coal can be transported at a reasonable cost and, perhaps, can be used directly in oil-fired industrial furnaces with a minimum of modification. Before an assessment can be made of the feasibility of this scheme, one must know more concerning the effects of the presence of coal particles on the liquid fuel combustion process. A specific concern is the effect of coal particles on the atomization of the coal-oil slurry, especially by the fact that the size of coal particles may be close to the nominal size of the droplets produced by atomization of the fuel alone. Experiments have been conducted to measure the drop size produced by atomization of a coal-methanol slurry with a two-fluid atomizer. The data show that the presence of the coal particles at concentrations up to 30% does not significantly affect the droplet size.

31145 **(ARI-RP—137) Kinetic study of NO/sub x/ formation and removal processes in combustion streams. Third quarterly technical progress report, December 1, 1982-February 28, 1983.** Silver, J.A. (Aerodyne Research, Inc., Billerica, MA (USA). Center for Chemical and Environmental Physics). Mar 1983. Contract AC21-82MC19028. 19p. NTIS, PC A02/MF A01. Order Number DE83011066.

The production of nitric oxide form combustion of hydrocarbon fuels with air has been recognized to be a serious potential health hazard. In dirtier fuels such as coal and oil shale, a major source of nitric oxide occurs due to the reactions of small hydrocarbon fragments with the nitrogen in the air. These reactions take place in the rich part of the combustion flame and are termed the Prompt-NO mechanism. However, the detailed reaction sequence and rates of these reactions are not well known. The purpose of this work is to directly measure key reaction rates of the CH radical and subsequent HCN reactions which form the basis for Prompt-NO production. During this quarter, efforts have been focussed on constructing a chemical model to elucidate the key reaction mechanisms affecting the formation of nitric oxide in the rich part of the flame.

31146 **(CONF-8104190—2) Natural-sorbent attrition and elutriation characteristics in fluidized-bed coal combustors.** Wilson, W.I.; Fee, D.C.; Myles, K.M.; Johnson, I.; Fan, L.S. (Argonne National Lab., IL (USA); Ohio State Univ., Columbus (USA). Dept. of Chemical Engineering). 1981. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83010557.

From 8. annual meeting of National Organization of Black Chemists and Chemical Engineers; Chicago, IL, USA (22 Apr 1981).

Laboratory test methods have been developed to measure the attrition and elutriation characteristics of limestones in an atmospheric-pressure fluidized-bed coal combustor (AFBC) at 850°C. The attrition constant and elutriation rate were determined for a group of limestones when the system is assumed to be at steady state; that is, after sorbent breakup due to thermal shock and decrepitation during calcination of the sorbent feed are completed. An attrition model has been developed to analyze the laboratory data to predict sorbent performance in AFBCs. The attrition model assumes that the particle disintegration occurs from the abrasive removal of material from the surface of the particle rather than by particle fracture. The attrition constants of the limestones tested ranged from 1.5×10^{-6} sec^{-1} to 9.2×10^{-6} sec^{-1}, and the elutriation rate had a fractional mass loss which ranged from 8.1×10^{-8} min^{-1} to 1.0×10^{-3} min^{-1}. The test methods and techniques utilized by the model are undergoing refinement to improve the accuracy of the prediction. The attrition and elutriation of a sorbent in a fluidized-bed combustor affects the sorbent performance in a complex manner. The obvious case is the extreme situation where so much sorbent material is lost from the bed via attrition and elutriation that a constant bed height cannot be maintained. Because this aspect is an important consideration in sorbent selection, standard laboratory test methods have been developed to measure the attrition and elutriation characteristics of limestones in AFBCs.

31147 **(DOE/MC/14110—1349) Alexandria fluidized-bed process development plant. Annual report, March 1982-February 1983.** (Burns and Roe Services Corp., Oradell, NJ (USA); BENMOL Corp., Alexandria, VA (USA)). 1983. Contract AC21-80MC14110. 99p. NTIS, PC A05/MF A01. Order Number DE83010299.

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The Alexandria Atmospheric Fluid-Bed Combustion (AFBC) Process Development Unit (PDU) test program consisted of experimental operations intended to support overall AFBC process development. The primary objective was to support of further development of the MIT Steady-State Model. This objective was approached through: utilizing the Alexandria PDU as a pilot-scale test bed to support further Model development and calibration; providing experimental data to alleviate important information gaps within the Model database; and providing experimental data to aid in the calibration of the MIT Model by others. Experimental studies were conducted through a series of tasks. Each experimental

task consisted of a set of scheduled test runs utilizing the PDU. Experimental work related to the MIT Model at Alexandria was initiated in 1980. Previous to this report, the following have been published: Cold Mode Testing Topical Report, Hot Mode Testing Topical Report, Annual Report March 1980 - February 1981, and Annual Report March 1981 - February 1982. Rraders should consult these reports for an evaluation of the Model and a comparison between the Model predictions and Alexandria experimental data. As a result of these publications, a consensus was reached between DOE, MIT, and the Alexandria Team, which suggested the need for special types of data that could be used to modify the internal alquorithms of the Model and which subsequently resulted in the work reported herein. The model modification has been referred to as Model Calibration and would be performed by the party having custody of the Model. The role of the Alexandria Team was to perform tests and generate experimental data called for by the Model calibration effort.

31148 **(DOE/MC/14110—1350) Alexandria fluidized-bed process-development plant: bubble characteristics.** (Burns and Roe Services Corp., Oradell, NJ (USA); BENMOL Corp., Alexandria, VA (USA)). Dec 1982. Contract AC21-80MC14110. 89p. NTIS, PC A05/MF A01. Order Number DE83010792.

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Recent studies at DOE's Alexandria Atmospheric Fluidized-Bed Combustion (AFBC) Process Development Unit (PDU) have involved experimental verifications of predictions from the Massachusetts Institute of Technology's Coal AFBC Systems Model. Although Model predictions were quite accurate in many instances, there appeared to be several significant discrepancies between predicted values and association experimental data from the 3' x 3' (nominal) combustor at Alexandria. Experimental work at Alexandria related to the MIT Model was initiated in 1980. Readers should consult previous reports for an evaluation of the Model and a comparison between the Model predictions and Alexandria experimental data. As a result of these studies, a number of information gaps within the Model's database were identified, primarily related to the fluid dynamics submodel, which might account for some of the discrepancies noted. In an attempt to support further development and calibration of the MIT Model, facilities at the Alexandria PDU were committed to providing experimental data to alleviate some of the information gaps. The specific information gap focused upon during the period of January to August 1982 involved the bubble growth submodel within the fluid dynamics portion. The specific objective involved a series of tests designed to measure bubble characteristics within both cold and hot beds. Measurements were made under a variety of different conditions. The insights gained from the bubble characteristic related testing have been passed on to DOE and MIT, and used as the basis for implementing additional model refinements. Additional model verification activity is being carried out by DOE/METC. It is recognized that additional work will be necessary for the FBC Model to achieve the goal of being a useful aid for boiler designers.

31149 **(DOE/MC/16000—1294-Vol.2) Modeling of fluidized-bed combustion of coal. Volume II. AFBC component models. Final report.** Louis, J.F.; Tung, S.E.; Lee, D. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). May 1982. Contract AC21-81MC16000. 156p. NTIS, PC A08/MF A01. Order Number DE83001906.

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A theoretical study of the mechanism of the particle entrainment phenomenon relating the particle trajectories with bubbling actions in the bed allowed the development of a backbone model for the prediction of particle mass concentration profiles in the freeboard of a fluidized bed. Simple experiments in the freeboard of MIT 0.6m x 0.6m FBC unit were used to compare with the model calculations. Good agreements have been obtained. This entrainment model takes into account the stratification effect due to density difference of particles in a multi-component fluidized bed. Satisfactory agreements have been obtained in comparing the calculated char elutriation with experimental data. This mechanistic entrainment model has also been used in conjunction with a chemical kinetic description of the NO-char reaction for prediction of the reduction of NO along the height of the freeboard in fluidized coal combustion. Oxidation of carbon monoxide along the height of the freeboard (the combustion space between the top of the bed and the first row of heat exchange tubes) of a coal burning fluidized bed is also modelled and predicted CO concentration profiles are compared with measurements obtained in MIT 0.6 x 0.6m cross section 4.5m high experimental fluidized combustor. The CO oxidation model is based on a set of twenty-two homogeneous chemical reactions as proposed by Lyon and Hardy and on an assessment of the rate of heterogeneous recombination reactions of free radicals on the surfaces of solid particles carried by the fluidizing gas stream from the bed into the freeboard.

31150 **(DOE/MC/16000—1294-Vol.3) Modeling of fluidized-bed combustion of coal. Volume III. AFBC/PFBC system models manual. Final report.** Louis, J.F.; Tung, S.E.; Park, D. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). May 1982. Contract AC21-81MC16000. 47p. NTIS, PC A03/MF A01. Order Number DE83001907.

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The purpose of this manual is to describe how to access and use MIT's Fluidized Bed Combustor (FBC) System Program. Presently, the FBC program is stored in a Honeywell Computer System and can be accessed using the Multics interactive system. This manual answers questions that may arise regarding the mechanics of operating the system program, as well as warns of possible pitfalls and mistakes that could be made. The manual describes the procedures an individual would follow to become an active user of the system program and explains the various options available for reaching the Multics interactive system on Honeywell 6180 computer on which the program runs. For users outside the Metropolitan Boston area, a public network for data communications is described which is relatively inexpensive. TPSA, a subsystem of Multics has been developed to facilliate testing the program and carrying out parametric studies. The various input and output variables are stored in a database. The variables are divided into several groups, each group containing two or more variables. The database itself consists of these groups and the variables, their descriptive names, units and default values. The database structure does not differentiate between input and output variables. Finally, some sample sessions are presented to illustrate the login and logout procedures, the command language, and the data manipulation features of the FBC program.

31151 **(DOE/MC/16000—1294-Vol.5) Modeling of fluidized-bed combustion of coal. Volume V. FBC - data base management system description. Final report.** Louis, J.F.; Tung, S.E.; Lee, D. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). May 1982. Contract AC21-81MC16000. 198p. NTIS, PC A09/MF A01. Order Number DE83001909.

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A computerized data base developed with the Model 204 Data Base Management System consists of two parts, a parent data base and a condensed data base. The parent data base, a file group called FBC, is composed of seven Model 204 files. FBC contains 165 articles; 87 are journal papers and 78 are technical reports. The largest file, namely the POINTS file, contains over 100,000 records. About 30 programs have been designed to retrieve, manipulate, and display the data in the parent data base in different ways. Even the most complicated program is normally completed in less than ten minutes. The condensed data base, file group CFBC is composed of six Model 204 files, contains consolidated versions of the data in the parent data base and is used mainly for statistical analysis. A data entry procedure has been established and is working smoothly for the flow of data from articles into the data base. The heart of this data entry procedure is a group of three computer programs, which are described. Procedures have also been established to maintain the data base in the most efficient operating conditions. In particular, backup copies of files are obtained and stored on tapes on a regular basis. User passwords are periodically changed to protect the data base from fraudulent use.

31152 **(DOE/MC/16000—1294-Vol.6) Modeling of fluidized-bed combustion of coal. Volume VI. FBC: data base management system user's guide. Final report.** Louis J.F.; Tung, S.E.; Lee, D. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). May 1982. Contract AC21-81MC16000. 127p. NTIS MF A01. Order Number DE83001910.

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This text is an introductory tutorial guide to the user of the Fluidized Bed Combustion (FBC) Data Base at the Massachusetts Institute of Technology. The text is designed to be used as a self-contained course for the novice user of this data base. No previous experience with a computerized data base is assumed. However, the user is expected to know how to operate his or her computer terminal. The FBC Data Base was developed using the Model 204 Data Base Management System (M204). It runs under the VS1 operating system on the IBM System/370 computer at MIT's Information Processing Service. Although VS1 is a batch system, one of the M204 subroutines allows the data base to be used interactively like any other on-line system. As long as this subroutine is being executed, the data base can be accessed on-line. The FBC Data Base is designed to serve two purposes: First, it is an electronic library where experimental data related to fluidized bed combustion are stored on an article by article basis. Secondly, it serves as a research tool with which the user may: retrieve specific data; perform calculations with part or all of the retrieved data; or display the results in a number of ways. These two purposes are fulfilled by means of customized application programs. There are two categories of application programs: one serces the library purpose and the other serves the research purpose. Some programs are designed to perform one function only while others may perform more than one functions.

31153 **(DOE/MC/16000—1294-Vol.7) Modeling of fluidized-bed combustion of coal. Volume VII. Examples of data base applications users's guide. Final report.** Louis, J.F.; Tung, S.E.; Lee, D. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). May 1982. Contract AC21-81MC16000. 116p. NTIS, PC A06/MF A01. Order Number DE83001911.

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Generally, a user comes to the data base for help when he or she needs certain information. As the user knows from reading the User's Guide, information is retrieved from the data base via customized application programs. Information of general nature can usually be obtained from the execution of a single program. More specific information, however, can only be retrieved by the successive execution of several programs. In the event that the user is trying to reach a conclusion with the information retrieved, repetitious execution of the same sequence of programs will be necessary. Application programs are the building blocks with which a user constructs the channel for information flow. Whereas the User's Guide explains the purpose of each building block and how each one is used, this text illustrates the technique of putting the pieces together to bridge the gap between user and data. The general approach is to start with programs that provide a global view of the data, then gradually narrow down to specific information in a stepwise manner using different programs or different options of the same program. In this process of elimination or attrition, selection of the subsequent step is dependent on the result of the current step. The user's role, in this case, is to decide on the next step and select the appropriate program. The text consists mainly of examples. The content of the text by no means defines the boundary of application or the FBC data base. There are many problems that can be solved, partially or entirely, by executing the right combination of programs. The versatility of the data base is left to the user to explore.

31154 **(DOE/MC/19329—1405) Advanced atmospheric fluidized-bed combustion design: internally circulating AFBC. Final report.** Keairns, D.L.; Altiner, H.K.; Hamm, J.R.; Ahmed, M.M.; Weeks, K.D.; Bachovchin, D.M.; Kececioglu, I.; Ulerich, N.H.; Yang, W.C. (Westinghouse Research and Development Center, Pittsburgh, PA (USA)). Jan 1983. Contract AC21-82MC19329. 349p. NTIS, PC A16/MF A01. Order Number DE83010973.

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This report defines and characterizes an advanced, industrial, fluidized-bed combustion concept - the internally circulating AFBC - having superior performance and cost characteristics. The internally circulating AFBC incorporates four major innovative features (single fuel feed; jet-attrition-controlled sulfur removal; multiple air staging; and high-velocity, single vessel integral design using draft tube circulation) to achieve: high boiler thermal efficiency (approaching 90% through integral design, high combustion efficiency, and low sorbent consumption); fuel flexibility (single coal feed point, coal size up to nominal 2 in, flexible air distribution, capability of feeding and combusting gaseous and liquid fuels); high reliability (simplified fuel feed and solids handling); turndown flexibility (degree and ease of turndown achieved by integral segmented bed, staged air distribution); low sorbent requirements for high SO_2 control (Ca/S <2 for greater than 90% removal using jet-attrition-controlled sulfur removal); low NO/sub x/ emissions (0.1 lb/10^6 Btu through multiple stages of air injection and capability of maintaining high carbon content); compact design (single, shop-fabricated, rail-shippable units with capacity up to 150 x 10^6 Btu/hr for high-velocity operation); and low cost (simplified, integral function design with high efficiency). Westinghouse concludes that the internally circulating AFBC concept has great potential for industrial market acceptance because of its effective performance and high reliability at low steam generation costs. The concept merits further development to evolve its innovative features further and to determine its commercial design configuration and operating conditions.

31155 **(EPRI-CS—2913) Evaluation of peat as a utility boiler fuel. Final report.** Bongiorno, S.J.; Strianse, R.V. (Burns and Roe Services Corp., Oradell, NJ (USA)). Mar 1983. 286p. NTIS, PC A13/MF A01. Order Number DE83901993.

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The objective of this study was to assess the technical and economic feasibility of the direct combustion of peat for electric power generation in the United States. The study includes a review of peat literature, selection of a region in the US to locate a hypothetical peat-harvesting operation, and an assessment of current practices for peat utilization in Europe, including peat harvesting, environmental control, and combustion technology. The conceptual design of a peat-harvesting facility supplying 1.4 million tons/yr of peat to a 2 x 150 MW power plant located in eastern North Carolina is developed for the purpose of estimating peat fuel costs. Environmental-control measures and peat transportation systems are identified. Budget capital and operating costs for a peat-fired power plant are estimated and the busbar cost of electricity compared to that for a 1 x 300 MW coal-fired power plant. Technical feasibility is demonstrated, although environmental acceptability of a large-scale peat harvesting operation must be confirmed on a site-specific basis. Peat fuel costs are found to be less than coal costs for a power plant located adjacent to the peat bogs in eastern North Carolina. The higher capital cost of a peat-fired power plant offsets to some extent the fuel cost advantage. Peat is found to have an electricity cost advantage of about 5 to 25% when compared to coal on a 30 year levelized basis depending on the peat escalation rate assumed.

31156 **(EPRI-CS—2930) 6- x 6-ft atmospheric fluidized-bed combustion development facility and commercial-utility AFBC design assessment.** Apa, R.P.; Bloss, J.M.; Daniel, P.L. (Babcock and Wilcox Co., Barberton, OH (USA). Fossil Power Generation Div.). Mar 1983. 365p. NTIS MF A01. Order Number DE83901979.

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Atmospheric Fluidized-Bed Combustion (AFBC) is being developed by the Electric Power Research Institute and Babcock & Wilcox as a possible alternative to the conventional pulverized coal boiler equipped with a wet (or dry) scrubber. This program comprises four tasks; three of which are covered in this report. An earlier report (EPRI CS-1688) documented the design and construction of the 6' x 6' AFBC Test Facility. This report contains data generated by the 6' x 6', an analysis of the data and R & D Support Studies. Design Data Assessment and Evaluation efforts were directed toward extending our knowledge of fluidized bed combustion through analysis of the 6' x 6' data. During 1979, efforts were continued in an attempt to improve predictive capabilities in the areas of combustion efficiency, sulfur capture, and heat transfer. Analysis of the data has shown that a broader range of operating conditions (types and sizes of coal and limestone, superficial velocities, and calcium-to-sulfur ratios) is required to improve the confidence level of the models. The focal point of the program is directed toward 6' x 6' operation. In 1979, three major accomplishments were achieved through operation of the 6' x 6'. A distributor plate suitable for commercial service was installed in the 6' x 6' after two previous types proved unsatisfactory. The current design employs bubble caps to be used in conjunction with a water-cooled floor for a commercial unit. A single coal feed-point test showed that the number of feed points in a commercial unit could be reduced from the generally accepted value without inhibiting unit performance. Finally, testing on the 6' x 6' showed that carbon burnup beds may be eliminated in favor of fly ash recycle as a method of increasing combustion efficiency. Recycle has the added advantage of increasing sulfur retention and calcium utilization. R & D support studies performed by Westinghouse and Oregon State University are described.

0150 Marketing And Economics

REFER ALSO TO CITATION(S) 31168, 31170, 31171, 31201, 31817, 31837, 31908

31157 (DOE/EIA—0125(82/3Q)) Coal distribution, January-September 1982. McNair, M.B. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jan 1983. 94p. NTIS, PC A05/MF A01. Order Number DE83011157.

This publication provides volume data on coal distribution by coal producing district, consumer use, and method of transportation. All data for 1982 in this report are preliminary. Data for 1978-1981 are final. Production and/or purchases of coal in the United States from January-September 1982 totaled 628.9 million short tons or 8 percent more than the 582.3 milion tons produced or purchased during the same period of 1981. The January-September 1981 coal production was curtailed by the United Mine Workers of America strike that began on March 27 and ended on June 7. Distribution of coal during the first nine months of 1982 totaled 617.6 million tons, an increase of 6 percent over the 584.8 million tons distributed during January-September 1981. A total of 14.4 millions of coal was added to stocks held by producers and distributors during January-September 1982. Railroads hauled 316.5 million tons or 59 percent of the 532.9 million tons of coal shipped to consumers in the United States from January-September 1982. Water transportation ranked second with 88.5 million tons or 17 percent, followed in descending order by truck, 74.3 million tons (14 percent), and tramway/conveyor and slurry pipeline, 52.5 million tons (10 percent). The method of transportation for the remaining 1.2 million tons (0.2 percent) was either unknown or concealed to avoid the disclosure of individual company data.

31158 (DOE/EIA—0125(82/4Q)) Coal distribution, January-December 1982. McNair, M.B. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Mar 1983. 170p. NTIS, PC A08/MF A01. Order Number DE83011156.

This report provides volume data on coal distribution by coal producing district, consumer use, and method of transportation. All data for 1978-1982 are final. Production and/or purchases of coal in the United States from january-December 1982 totaled 822.5 million short tons, less than 1 percent more than 819.3 million tons produced or purchased during the same period of 1981. The January-December 1981 coal production was curtailed by the United Mine Workers of America strike that began March 27 and ended on June 7. Distribution of coal during 1982 totaled 813.7 million tons, a decrease of 1 percent from 820.8 million tons distributed during January-December 1981. A total of 11.6 million tons fo coal was added to stocks held by producers and distributors during January-December 1982. Railroads hauled 421.5 million tons or 59 percent of te 709.6 million tons of coal shipped to consumers in the United States from January-December 1982. Water transportation ranked second with 116.9 million tons or 16 percent, followed in descending order by truck, 99.9 million tons (14 percent), and tramway/conveyor and slurry pipeline, 69.6 million tons (10 percent). The method of transportation for the remaining 1.7 million tons (0.2 percent) was either unknown or concealed to avoid the disclosure of individual company data.

31159 (EAS-G—3-82) Constraints on international trade in coal. Long, R. (IEA Coal Research, London (UK). Economic Assessment Service). Dec 1982. 146p. IEA Coal Research, Economic Assessment Service, London, England.

This paper examines several constraints which might prevent a high level of international trade in coal from being reached by the end of the century. Trade growth projections concentrate on seaborne, thermal coal, but this is set in the context of total international trade. The projections are based on a detailed analysis of global energy balances, disaggregated by source, end use, and region. Constraints are examined under three headings: coal quality; physical infrastructure; and capital requirements. (79 refs.)

31160 (EAS-G—3/82) Constraints on international trade in coal. Long, R. (International Energy Agency Coal Research, London (UK). Economic Assessment Service). Dec 1982. 144p. NTIS (US Sales Only), PC A07/MF A01.

This report examines a number of constraints which might prevent a high level of international trade in coal from being reached by the end of the century. The trade growth projections concentrate on seaborne thermal coal, but this is set in the context of total international trade (including land-borne and coking coal). The trade has been projected on the basis of a detailed analysis of global energy balances disaggregated by source, end use, and region. Constraints have been examined under the three headings: coal quality; physical infrastructure; and capital requirements. The summary conclusion is that the main constraint on international coal trade is the uncertainty of demand arising from poor economic growth prospects. Unlike the oil industry where the emphasis is now on discovering non-OPEC supplies, major coal supplies are known to exist and await only the assured market which will make investment and cash flow appraisal positive. Governments will do as much to help the industry by encouraging economic recovery as by direct involvement. 1 figures, 54 tables.

31161 Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). 276p. (CONF-7907126—). NTIS, PC A13/MF A01. Order Number DE83007158.

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

This volume contains revised updated versions of 15 papers originally presented at a 1979 conference sponsored by the Jet Propulsion Laboratory (JPL) and the Department of Energy (DOE) in Carmel, California. The overall purpose was to analyze and critique the contributions of long-term forecasting models to the federal government's effort in energy planning and policy formulation, with specific emphasis on the coal-supply area. The immediate impetus for the meetings was JPL's need for more-accurate and disaggregated estimates of the level of coal production likely to exist about the year 2000. These estimates would then play a significant role in guiding JPL's development of an Advanced Underground Coal Extraction System by determining the most-viable private-sector markets for such a system when developed. All papers have been abstracted and indexed for inclusion in the Energy Data Base (EDB) and ERA and EAPA.

31162 **Coal resource uncertainty and its importance in modeling for public policy analysis.** Holloway, M.L. (Texas Energy and Natural Resource Advisory Council, Austin). pp 5-21 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The quantification of uncertainty in the coal resource base will improve energy analyses in a number of ways. Better information to determine the extent to wchich geological information on various coal basins in adequate to describe the quantity and quality of coal is a major benefit. Further, supply models which attempt to forecast production of coal over time in response to price changes and other factors can be greatly improved by providing confidence intervals for reserve numbers and other related coal parameters uch as overburden ratios, seam thickness, and sulfur content. Indeed, such information will become the basis for improved models of coal-supply. In the meantime, quantification of uncertainty of coal reserves can improve the performance of existing coal-supply models such as CSM and the National Coal Model. The results of the example exercise summarized here indicate the importance of such improved estimates. By relating sampling and geology to uncertainty of coal reserves, one can complete benefit/cost analyses to provide decision makers with information about drilling programs in order to reduce uncertainty. More detailed stuyd of individual coal basins and improved methods of relating coal reserves and production to overburden, seam thickness, sulfur content, mine size, and other factors will allow a reduction in uncertainty in the nation's most-abundant fossil-energy source and improve supply modeling for industry and government planning. 1 figure, 3 tables.

31163 **Policy models and policymakers: the case of industrial energy use.** Roach, C. (ICF, Inc., Washington, DC). pp 23-36 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The author offers a detailed menu in his attempt to provide a cookbook useful in developing process or technology models for the industrial sector(s) related to the market for coal. His discussion of the advantages and disadvantages of the use of technology models is concise and to the point: can be detailed enough in our modeling efforts for precise estimates at a reasonable cost. Although the process models tend to be more realistic and understandable, to readily accommodate the consideration of new technology, and to be less dependent on questionable assumptions regarding exogenous circumstances (e.g., environmental regulations), such models also tend to be relatively narrow (or else expensive) and to therefore be of limited utility to policymakers while requiring detailed data. Although he focuses on Boiler Models in leading the reader through the remainder of his cookbook, the points he makes are germane to this larger question. He recommends that the model be structured such that one explicitly considers: the investment decision; boiler-fuel demand; supply constraints; and the appropriate auxiliary models which provide inputs to the other three model segments. His identification of the cost data requirement is especially useful, although he leaves us with only an introduction to one of the most crucial and controversial issues - that of the disaggregation problem encountered in many technology models. 1 figure.

31164 **Analysis of the Energy Information Administration's Coal-Supply Model.** Wood, D.O.; Mason, M.J. (Massachusetts Inst. of Tech., Cambridge). pp 37-57 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The Coal Supply Model (CSM) is a central feature of the principal models used in government-based studies of coal-related energy and environmental policy. The Energy Model Analysis Program (EMAP) review summarized in this paper identifies and analyzes, via sensitivity analysis, four issues relating to the CSM formulation and associated data, issues which complicate interpretation of CSM results. Taken togetehr, the results of the EMAP review suggest directions for new research and data development. Most important is providing a more-explicit treatment of the determinants of mine lifetime and consideration of user costs, developments which should be research priorities for the EIA. A related research problem is obtaining information on the distribution of reserves by deposition characteristics, a data development and analysis problem for the Bureau of Mines and the Geological Survey. Finally, the sensitivity of model results to plausible changes in the reserve base suggests both that updating and refinement of recoverable-reserve estimates is important, and that more attention should be devoted to determining the level of production region aggregation supported by the data. In general, disaggregation of producing regions and coal types unsupported by reliable data seriously complicates the interpretation of model results, and reduces CSM credibility. 9 tables.

31165 **Crux of long-term coal demand: the market penetration of nuclear.** Childress, J.P. (Dept. of Energy, Washington, DC). pp 91-103 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

This paper is meant to be a prospectus for further development in long-term applications of models in the energy field. Morecareful analysis of actual utility company planning and decision making would help guide the model development. However, it is clear that the market share of nuclear plants will largely determine coal use in the next 30 to 50 years, and any attempt to forecast this must address the uncertainty surrounding that penetration. 4 figures, 4 tables.

31166 **Kantian perspective on the social rate of discount.** Page, R.T. (California Inst. of Tech., Pasadena). pp 139-157 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

This paper deals with the need to incorporate concern for individuals who will be affected in one way or the other in the future, but who have no policy voice in the present. The author's specific concern with the derivation of an intergenerationally fair social discount rate has obvious implications in situations where energy/coal models' results are inputs into decisions which would dramatically change future economic and social possibilities for generations to come. His suggestions stand in stark contrast to the present federal government standard requirement to use a ten percent discount rate in the evaluation of such projects. 1 table.

0160 Health And Safety

REFER ALSO TO CITATION(S) 31106, 31117, 31118, 31122

31167 **(PB—83-147777) Guidelines for environmental monitoring in underground coal mines (phase 1 report). Minerals research contract report 1981-82.** Wright, H.A.; Madden, R.; Rubin, M.N. (Bolt, Beranek and Newman, Inc., Cambridge, MA (USA)). Jun 1982. 177p. NTIS, PC A09/MF A01.

This report assesses the economic, legal, institutional, and technical factors that affect the current and future status of implementation of mine monitoring systems in the United States. It begins with a description of a poll of the Mining Production Research Committee and the Mine Monitoring and Communications Committee of Bituminous Coal Research that was conducted to establish industry monitoring needs and constraints. Existing systems in the United States and foreign countries are then reviewed and compared with the requirements set forth by the industry committees. At the same time, State and Federal mining laws are reviewed, and equipment presently available from suppliers of mine monitoring systems and components is discussed.

31168 **(PB—83-149161) Economic analysis of surface mining mobile equipment fire protection systems. Report of investigations/1982.** Pomroy, W.H.; Goodwin, N.; Lynch, F. (Bureau of Mines, Twin Cities, MN (USA). Twin Cities Research Center). Oct 1982. 29p. NTIS, PC A03/MF A01.

The Bureau of Mines, through a 4-year program of combined in-house and contract research, has developed the necessary hardware and software technology to provide rugged, reliable automatic fire protection for surface mining mobile equipment. One element of this program was a continuing effort to help foster rapid mining industry acceptance of the technology by keeping end user costs reasonable. This report is an analysis of the economic impact of surface mining mobile equipment fires and the cost benefit of utilizing automatic fire protection systems to abate these losses.

0170 Legislation And Regulations

REFER ALSO TO CITATION(S) 31162, 31163, 31816, 31823, 31824, 31861, 31862

31169 (CONF-8006253—, pp vp) **Official permit procedures for coal gasification and coal hydrogenation plants.** Pielow, E. 1980. (In German). NTIS (US Sales Only), PC A04/MF A01.

From Symposium on coal gasification and coal hydrogenation; Essen, F.R. Germany (13 Jun 1980).

The choice of the plant location for coal refining plants is determined by the space requirement of the plant and suited transportation facilities and to a not lesser extend by taking into account the demands of the adjacent communities. As far as the plant is not built in direct relation with coal mining a planning procedure for the supervision of the construction has to be carried on for the concerned location. If the plant is erected in direct relation with coal mining an operation plan procedure according to mining laws is necessary in addition to the permit by the Federal immission control laws. Probable requirements in the official permit procedure will be: limitation of emissions of SO_2, cancerogenic substances, H_2S, phenols a.o..

31170 **Modeling the impact of coal-conversion regulations.** Montgomery W.D. III. (Resources for the Future, Washington, DC). pp 59-72 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The Powerplant and Industrial Fuel Use Act (FUA) was signed into law on November 9, 1978. The Act gave the Department of Energy (DOE) powers to reduce the use of oil and gas in certain electric powerplants and major-fuel- burning installations (MFBI). Implementation of the Act rquired the promulgation of an extensive set of regulations which, under the executive order on improving government rgulations, were required to be accompanied by a regulatory analysis. The Energy Information Administration was asked to assist in the preparation of the regulatory analysis by evaluating the costs, benefits, and effects on energy supply and demand of alternative methods of implementing the Act. The request was made early in 1978, so that it was possible to issue the regulatory analysis an an initial set of regulations within a week of signing of the Act. The results of this analysis were published in an EIA report. The purpose of this paper is to describe the process by which the analysis was designed and by which the results of a large-scale modeling exercise were made accessible to policymakers. The process had four important stages: (1) description of alternatives; (2) development of scenarios; identification of program objectives; and (4) communication of results.

31171 **Federal coal-leasing program: a William Tell approach to coal models.** Mann, C. (Dames and Moore, Washington, DC). pp 77-90 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The Federal coal-leasing program, which was halted in 1970, appears likely to start again. The DOE will use its National Coal Model to predict the demand for coal by producing area and type for 1985, 1990, and 1995. The Department of the Interior (DOI) will use these estimates to determine the amount of coal that should be offered for lease in various parts of the West. (The structure of this program is outlined in the DOE Final Environment Statement.) This paper addresses some of the problems that may result from this use of the National Coal Model results. The DOE projections of leasing needs for the west-central Colorado coal-producing area are examined in detail in order to illustrate the way in which the model may lead one astray. 3 figures, 3 tables.

02 PETROLEUM

REFER ALSO TO CITATION(S) 31018, 31807

0202 Geology And Exploration

31172 **(DOE/ET/46615—T3) Petroleum potential of the Palo Duro Basin, Texas Panhandle. Report of investigations No. 123.** Dutton, S.P.; Goldstein, A.G.; Ruppel, S.C. (Texas Univ., Austin (USA). Bureau of Economic Geology). 1982. Contract AC97-80ET46615. 134p. NTIS, PC A07/MF A01. Order Number DE83011099.

Porous facies in Pre-Pennsylvanian, Pennsylvanian, and Permian strata are potential hydrocarbon reservoirs. Within the pre-Pennsylvanian section, shallow-marine carbonates of both Ordovician (Ellenburger Group) and Mississippian age have sufficient porosity and permeability for hydrocarbon accumulation. Three main exploration targets of Pennsylvanian and Wolfcampian age are (1) granite-wash sandstones, (2) shelf-margin carbonates, and (3) elongate-delta sandstones. Granite wash was deposited in fan deltas adjacent to fault-bounded, basement uplifts around the basin margins. Porous facies are braided-channel, fan-plain, and distal-fan deposits. Porous carbonates developed through time along the different positions of the shelf margins. Organic-rich basinal shales are juxtaposed against the porous shelf-margin facies. High-constructive, elongate-delta deposits in the southeastern part of the basin retain high porosity in bar-finder sandstones. In younger strata, dolomites in the Clear Fork and the San Andres. Porosity in these units apparently pinches out to the north. Both stratigraphic and structural traps occur in the basin. Porosity pinch-outs form the primary stratigraphic traps. Major faults are associated with the Amarillo Uplift; smaller faults have been identified in the deeper parts of the basin. The Palo Duro Basin contains source rocks of sufficient quality to generate hydrocarbons. Pennsylvanian and Wolfcampian shales contain up to 2.4 percent total organic carbon and are fair to very good source rocks. Lipid-rich organic matter occurs primarily in basinal shales. Kerogen color and vitrinite reflectance, which measure thermal maturity, indicate that temperatures were sufficiently high to begin to generate hydrocarbons from lipid-rich organic matter. Average reflectance in Pennsylvanian vitrinite is 0.52%; in Wolfcampian samples the average reflectance is 0.48%. Recent oil discoveries in the Palo Duro Basin confirm that oil was generated.

31173 **(NMERDI—2-66-3104) Cenozoic volcanic centers in the New Mexico segment of the Pedregosa Basin: constraints on oil and gas exploration in southwestern New Mexico. Final report.** Elston, W.E. (New Mexico Univ., Albuquerque (USA). Dept. of Geology). 1983. 59p. NMERDI, Univ. of New Mexico, 117 Richmond Drive, NE, Albuquerque, NM 87106.

Located in the southwestern corner of New Mexico, southern Hidalgo County occupies a segment of the Pedregosa sedimentary basin and is crossed by a belt of Laramide thrust faults. These factors favor accumulations of oil and gas. The present investigation has documented a constraint on probable oil and gas accumulations, the occurrence of major mid-Tertiary Valles-type ash-flow cauldrons and indications of underlying plutons. Indications of cauldrons have been found in the following ranges: in the southern Pyramid Mountains (Muir cauldron), south-central Peloncillo Mountains (Rodeo cauldron), Gaudalupe Mountains (Geronimo Trail

cauldron), Sierra San Luis (San Luis cauldron), Southern Animas Mountains (Tullous, Animas Peak, Cowboy Rim cauldrons), Central Animas Mountains (Juniper cauldron), and Apache Hills (Apache cauldron). No indications of cauldrons or other major volcanic centers have been found in the southeastern corner of Hidalgo County, including the southern Sierra Rica, Big Hatchet Mountains, Alamo Hueco Mountains, and Dog Mountains. These cauldron-free areas offer the most favorable prospects for petroleum exploration.

31174 **(NP—25192) Petroleum: an alternative for Mexican development. Technical papers series No. 19.** Caballero, R.F. (Texas Univ., Austin (USA). Inst. of Latin American Studies). 1978. 15p. (In Spanish). Univ. of Texas, Office for Public Sector Studies, Inst. of Latin American Studies, Austin, TX 78713.

A brief history of petroleum exploration, present and future production potential, and resources are discussed. Tabular data on petroleum and petroleum product production sites and annual capacities are presented. Location of those sites are indicated on a map. 43 references, 1 figure, 1 table.

31175 **(NP—3901760) Atoka Group (Lower to Middle Pennsylvanian), northern Fort Worth Basin, Texas: terrigenous depositional systems, diagenesis, and reservoir distribution and quality. Report of investigations No. 125.** Thompson, D.M. (Texas Univ., Austin (USA). Bureau of Economic Geology). 1982. 65p. Bureau of Economic Geology, Univ. of Texas, Austin, TX 78712.

The Fort Worth Basin, in North-Central Texas, is a late Paleozoic foreland basin that was downwarped during the Early to Middle Pennsylvanian Period in response to tectonic stresses that also produced the Ouachita Thrust Belt. The Atoka Group was deposited durjng the initial westward progradation of chert-rich terrigenous clastics derived both from the Ouachita Thrust Belt and locally from the Muenster Arch across the northern part of the basin. At the northern end of the basin, the Atoka Group interfingers with arkosic conglomerates (granite wash) derived from the Red River-Electra Arch. The granite wash is time equivalent but constitutes a separate stratigraphic sequence. The Atoka Group contains three distinct packages of terrigenous deposits: (1) the lower Atoka lithogenetic unit, interpreted to be a fluvially dominated fan-delta system, (2) the upper Atoka Davis lithogenetic subunit, interpreted to be a system of coalesced wave-dominated deltas, and (3) the upper Atoka post-Davis lithogenetic subunit, interpreted to be a thin, poorly integrated, fluvially dominated fan-delta system. Atoka Group sandstones are quartz-rich feldspathic (chert) litharenites. The most significant diagenetic events were silica dissolution and cementation. Net porosities of 10 to 15% are the result of the preservation of original porosity in between quartz overgrowths and the creation of secondary porosity by chert grain dissolution. Highest porosities occur in channel-fill and coarse-grained fan-delta plain facies. The Atoka Group has a cumulative production history of more than 160 million barrels (oil plus gas equivalent). Production and reservoir distribution and quality are facies controlled. Most oil and gas fields coincide with the distribution of lower Atoka fan-delta lobe complexes. Minor production is located along the axes of upper Atoka post-Davis fan-delta complexes.

0203 Drilling And Production

REFER ALSO TO CITATION(S) 31201, 31207, 31346

31176 **(AEEW-R—1438) Gamma-neutron interaction method for saturation measurements in EOR flood experiments.** Puckett, D.A.; Robinson, D.P. (UKAEA Atomic Energy Establishment, Winfrith. Safety and Engineering Science Div.). Nov 1982. 90p. UKAEA, Safety and Engineering Science Division AEE, Winfrith, Dorchester, Dorset, England.

This report describes an extensive programme of work carried out under contract to the Department of Energy investigating both theoretically and experimentally the use of a gamma-neutron technique for saturation measurements within the long cores to be used in high pressure enhanced oil recovery flood experiments. The accuracy of spatial resolution of saturation fronts is considered in detail and the applicability to experimental situations is reviewed. 42 figures, 7 tables.

31177 **(DOE/BC/10033—7) Evaluation of the Coalinga Polymer Demonstration Project.** Duane, N.C.; Dauben, D.L. (Keplinger and Associates, Inc., Tulsa, OK (USA)). Apr 1983. Contract AC19-80BC10033. 24p. NTIS, PC A02/MF A01. Order Number DE83010621.

The Coalinga Polymer Demonstration Project was designed by the Shell Oil Company to show the relative merits of water and polymer flooding in a reservoir with medium-viscosity oil. Located in the East Coalinga Field, Fresno County, California, the 149-acre project area contained four +-22-acre inverted five-spot injection patterns. The target reservoir was a 350-foot-thick, unconsolidated sandstone formation at about 2000 feet. Following nearly two years of water injection and an extensive field polymer injectivity and filtration study, polymer injection into four injection wells began in May 1978. The production response to polymer injection was less than expected and the project was terminated early. Two major contributing factors that resulted in the poor performance were: (1) a loss of polymer injectivity; and (2) a lack of movable oil in the project area. The loss of polymer injectivity was thought to be caused by near wellbore plugging by unhydrated biopolymer and bacterial debris. After polymer injection had begun, a subsequent petrophysical study indicated that little movable oil remained in the project area after primary production. The project was designed and operated in an expert manner. However, recommendations are made on how the project could have been improved if initiated today. These include: (1) Appropriate petrophysical studies, conducted prior to project initiation, should be conducted to guide the selection of the most suitable area within the feld. (2) Polymer injectivity could be improved by completing wells in unconsolidated formations with a screen and liner/gravel pack and by using currently available biopolymers which contain less bacterial debris. These practices will minimize the amount of filtration that is required on location. 7 figures, 2 tables.

31178 **(DOE/BC/10412—40) Assessment of water issues associated with enhanced oil recovery: a user's guide.** Shields, J.; Kaplan, E.; Royce, B.A. (Gulf Universities Research Consortium, Bellaire, TX (USA); Brookhaven National Lab., Upton, NY (USA)). Apr 1983. Contract AS19-81BC10412. 199p. NTIS, PC A09/MF A01. Order Number DE83012194.

This is a user's manual for effectively evaluating water issues associated with enhanced oil recovery (EOR) production. It is designed to provide ready reference and to assist EOR producers, energy planners, and decision-makers in assessing the impacts of water issues related to EOR production. An evaluation is made of EOR water requirements using public available information, data from actual field applications, and information provided by knowledgeable EOR technologists in 14 different major oil companies. Water quantity and quality requirements representing the total water needed from all sour' es (e.g., aquifers, lakes, etc.) are estimated for individual EOR processes in those states and specific geological locations where these processes will likely play major roles in future petroleum production by the year 2000. A reduction in these quantities can be achieved by reinjecting some or all of the produced water potentially available for recycle (i.e., some is lost in oil and water separation treatment processes) in the recovery method. Data and information for quantity and quality of surface and ground water availability and competing entities by four major user categories are presented on a qualitative and quantitative basis on a state-county basis from monitoring sites nearest existing EOR projects. Information regarding regulatory bodies responsible for the control of water supply and use is presented in tabular form by state only because of the volume and complexity of material. While no major EOR project to date has ever been abandoned because of water supply problems, factors such as competing regional uses for water, drought situations, and scarcity of high quality surface and ground water could be impediments to certain projects in the near future. 6 figures, 22 tables.

31179 **(DOE/BC/20001—11) Tertiary oil-recovery-processes research at the University of Texas. Final report.** Schechter, R.S.; Wade, W.H. (Texas Univ., Austin (USA)). Apr 1983. Contract AC19-79BC20001. 173p. NTIS, PC A08/MF A01. Order Number DE83012193.

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During the past year we have continued two major projects: (1) the design and evaluation of newly made surfactants and (2) the adsorptive behavior of surfactant systems. In addition to these ongoing projects, we have initiated a study on mobilization of oil droplets. In surfactant design and evaluation we have completed room temperature studies on branched alkyl benzene sulfonates, gotten well under way on secondary alkane sulfonates, and initiated studies on α-olefin and ethoxylated alkane sulfonates. In surfactant adsorption studies, we have (1) investigated the influence of alcohol cosolvents on the adsorption of sodium laurate on powders, (2) continued studies of adsorption from microemulsions, (3) continued studies on monomer/micellar equilibrium by ultrafiltration, and (4) measured adsorption from excess aqueous phases. Finally, the recently initiated mobilization studies are being done under both equilibrium and non-equilibrium conditions. 46 figures, 2 tables.

31180 **(DOE/BETC/IC—83/2) Abandoned oil fields in Alaska, California, Colorado, Montana, North Dakota, Utah and Wyoming.** (USDOE Bartlesville Energy Technology Center, OK). Apr 1983. 136p. NTIS, PC A07/MF A01. Order Number DE83012464.

This publication lists approximately 250 abandoned oil fields in Alaska, California, Colorado, Montana, North Dakota, Utah and Wyoming that have produced 10,000 or more barrels of oil before abandonment. The following information is provided for each field: county; DOE field code; field name; AAPG geologic province code; discovery data of field; year of last production; discovery well operator; proven acreage; formation thickness; depth of field; gravity of oil production; calendar year; yearly field oil production; yearly field gas production; cumulative oil production; cumulative gas production; number abandoned fields in county; cumulative production of oil from fields; cumulative production of gas from fields. (ATT)

31181 **(DOE/BETC/RI—83/1) Economics and analysis of the miscible CO_2 injection project, Granny's Creek field, West Virginia.** Smith, R.V.; Watts, R.J.; Burtch, F.W. (Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center). Apr 1983. 40p. NTIS, PC A03/MF A01. Order Number DE83010717.

The use of carbon dioxide (CO_2) in a tertiary oil recovery pilot in the Granny's Creek field, West Virginia, was started in 1976. At first the CO_2 was injected into the Pocono Big Injun sand at four wells at the corners of an approximately square area of 6.7 acres. The CO_2 was injected as a liquid, and the pilot portion of the reservoir was maintained at or above miscible pressure. Production was taken from a well inside the square pilot area and from eight wells outside the area. The test began with injection of water to increase reservoir pressure to more than the miscibility pressure. Injection started with CO_2 alone, then alternate slugs of CO_2 and water, then CO_2, alone, and finally water alone was injected. The additional oil recovery was 8,681 bbl for an injection total of 19.76 million lb of CO_2 for a ratio of 19,626 cu ft per bbl. A second or minipilot in which the injection was in the lower or C zone of the Big Injun sand resulted in 2,007.9 bbl of additional oil through September 1980 from the injection of 4.24 million lb of CO_2 for a ratio of 18,192 cu ft per bbl. The CO_2 spread quickly across the southern 350 acres of the field and confinement was not attained. The sales price of the oil after royalty and taxes is probably about equal to the most optimistic cost of the CO_2 per barrel of additional oil at the present time and far less than a more reasonable cost for the CO_2. Production of additional oil in each case decreased sharply after injection of CO_2 was stopped so there appeared to be no benefits over an extended period of time from the injection of CO_2.

31182 **(DOE/ET/12059—5) 200 Sand Steamflood Demonstration Project, Fifth annual report, June 1980-June 1981.** Alford, W.O. (Santa Fe Energy Co., Santa Fe Springs, CA (USA). Western Div.). Apr 1983. Contract AC03-76ET12059. 40p. NTIS, PC A03/MF A01. Order Number DE83010682.

The 200 Sand Steamflood Demonstration Project, a jointly funded venture between Santa Fe Energy Company - Western Division (SFE) and the United States Department of Energy (DOE), is testing an enhanced steamflooding technique in the Midway-Sunset Field, Kern County, California. The operational, recovery, and economic aspects of steamflooding a typical heavy oil reservoir, which had poor response to cyclic steam stimulation, are being demonstrated. The first phase was a pilot test consisting of four (4) 2.35 acre inverted seven-spot steam drive patterns. As a result of the response shown by the pilot, in April 1980, the second phase was initiated by beginning work to expand the pilot area to a total of fourteen (14) fully developed 2.35 acre inverted seven-spot patterns (Figure I-2). Expansion to a full-scale steamflood test consisted of drilling and completing 30 producing wells and 10 steam injection wells. The total project area consist of 42 producers and 14 injectors.

31183 **(DOE/MC/10642—1386) DYNAFRAC - application of a novel rock fracturing method to oil and gas recovery. Final report.** Moore, E.T. Jr.; Mumma, D.M.; Seifert, K.D. (Physics International Co., San Leandro, CA (USA)). Apr 1977. Contract AC21-79MC10642. 180p. NTIS, PC A09/MF A01. Order Number DE83010790.

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This document describes the results that were achieved in a program to develop and evaluate a new rock-fracturing method for increasing the productivity of oil and gas reservoirs. This method, called DYNAFRAC, is based on generating and extending multiple fractures in an oil or gas formation by using a small, downhole explosive source in a very controlled manner. The almost instantaneous borehole pressurization causes multiple vertical fractures to occur in the formation before stress relief can occur from the failure of the weakest plane of fracture. The salient features of the DYNAFRAC process are compared with those of other rock-fracturing methods in Section 2. Prior field tests of this process resulted in the formation of five vertical fractures in the open-hole sections of shallow, dry wells. Based on the amount of fluid displaced in these tests, it is estimated that each fracture extended approximately 5 feet into the formation and was limited only by the duration of the pressure pulse in the borehole. The results of these tests are described. The current program consisted of three principal tasks. The first task was to apply the DYNAFRAC process to at least five marginal (stripper) oil and/or gas wells to determine the productivity improvement that can be obtained using the short-radii, multiple fractures to overcome wellbore damage. The second task was to develop a method using a downhole propellant to increase the duration of the pressure and thereby extend the fracture radii further into the formation. The third task was to apply the improved DYNAFRAC process to a gas-bearing reservoir and compare the productivity improvement with that obtained by more conventional fracturing methods. The results of these tasks are described in Sections 4 to 6. Section 7 contains the conclusions and recommendations that have emerged from the tests and evaluations that were performed during the program. 72 figures, 5 tables.

31184 **(DOE/PC/30259—1-Vol.1) Evaluation of heavy-oil mining. Final report. Volume 1.** Piper, E.M.; Riddell, A.W.; Trent, R.H. (Energy Development Consultants, Inc., Golden, CO (USA)). Mar 1983. Contract AC03-80PC30259. 266p. NTIS, PC A12/MF A01. Order Number DE83011339.

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One of the technologies being advanced on an experimental basis for recovering heavy oil reserves is oil mining. So far, little has been done in this field, particularly in the United States. Because of this situation the US Department of Energy commissioned this study to determine the technical and economic feasibility of recovering heavy oil by mining or mining-assisted methods. The project consisted of the following three tasks: (1) evaluate the

heavy oil resource amenable to mine production; (2) evaluate mine technology; and (3) developed preliminary mining concepts for heavy oil resources. the first section of Volume I summarizes the work of the tasks and presents conclusions. Task I, which represents the bulk of Volume I, describes the selection process for determing the heavy oil reservoirs amenable to mining technology. Various screening processes are described along with target reservoirs. 44 figures, 13 tables.

31185 **(DOE/PC/30259—1-Vol.2) Evaluation of heavy-oil mining. Final report. Volume 2.** Piper, E.M.; Riddell, A.W.; Trent, R.H. (Energy Development Consultants, Inc., Golden, CO (USA)). Mar 1983. Contract AC03-80PC30259. 316p. NTIS, PC A14/MF A01. Order Number DE83011338.

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One of the technologies being advanced on an experimental basis for recovering heavy oil reserves is oil mining. So far, little has been done in this field, particularly in the United States. Because of this situation the US Department of Energy commissioned this study to determine the technical and economic feasibility of recovering heavy oil by mining or mining-assisted methods. The project consisted of the following three tasks: (1) evaluate the heavy oil resource amenable to mine production; (2) evaluate mine technology; and (3) develop preliminary mining concepts for heavy oil resources. Volume II contains Task II and Task III. Task II presents a historical review of heavy oil projects through current and planned projects. It also details various mining methods applicable to heavy oil mining. Task III describes the development of two site-specific heavy oil mining operations. 27 figures, 49 tables.

31186 **(DOE/SF/10762—3) Field demonstration of the conventional steam-drive process with ancillary materials. Final report.** Eson, R.L. (Chemical Oil Recovery Co., Bakersfield, CA (USA)). Mar 1983. Contract FC03-79SF10762. 211p. NTIS, PC A10/MF A01. Order Number DE83010553.

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The primary goal of the field demonstration was to evaluate the economic merits of ancillary materials in a conventional steam drive to improve sweep efficiencies. A number of important factors regarding the behavior of steam foam treated wells were observed. The most important were the use of injection profiles, chemical tracers, and production data to show that the creation of an in-situ foaming agent in a steam drive does indeed alter the flow path of the injected steam. This steam diversion creating improved sweep efficiency was identified in each of the four treated patterns; however, an improvement in oil production rates was identified in only two of the patterns. This fact points toward another important factor regarding the behavior of steam foam treated wells: namely, that it is not enough to simply improve the sweep efficiency of a steam drive pattern to improve the recovery economics. To augment production, the steam must be diverted into areas of the reservoir higher in oil saturation. If this is not accomplished, the steam foam diversion project will be a technical success (improved sweep efficiency) but an economic failure (no incremental production). This was demonstrated in the case of the two patterns treated on the Mitchel Lease. In the two patterns treated with the steam foam encapsulated in the polymer gel (COR-GEL), it was noted that minimal changes in the steam injection pressure and injection profiles were noted for at least 24 hours. After 24 to 48 hours, however, both wellhead steam injection pressures were increased and injection profiles showed significant alterations. The delay in steam foam activation was accomplished because the polymer gel prohibited the aqueous steam foam material from foaming until the polymer gel broke down due to the elevated temperature of the steam. This delay in activation allowed foam blockage to occur in the reservoir.

31187 **(NP—3901764) Frio Formation of the Texas Gulf Coast Basin: depositional systems, structural framework, and hydrocarbon, origin, migration, distribution, and exploration potential. Report of investigations No. 122.** Galloway, W.E.; Hobday, D.K.; Magara, K. (Texas Univ., Austin (USA). Bureau of Economic Geology). 1982. 126p. Bureau of Economic Geology, Univ. of Texas, Austin, TX 78712.

The Frio Formation is one of the major Tertiary progradational wedges of the Texas Gulf Coast Basin and has yielded nearly 6 billion bbl of oil and 60 trillion ft^3 of gas. The Frio and its updip equivalent, the Catahoula Formation, consist of deposits of two large fluvial and associated deltaic systems centered in the Houston and Rio Grande Embayments. Structures in the Houston Embayment are dominated by syndepositional deformation of underlying Jurassic salt. Mobilization of thick, undercompacted prodelta and slope muds characterized the tectonic evolution of the deltaic sequence in the Rio Grande Embayment. These two major deltaic depocenters are separated by a vertically stacked, strike-parallel barrier and strandplain system. Underlying interbedded, and transgressive shelf, prodelta, and continental slope mudstone sequences provide principal source and sealing facies. Sparse organic geochemical data and regional thermal and compaction-history analyses show that large volumes of hydrocarbons have probably been generated within, and effectively expulsed upward and landward from, normally to moderately undercompacted sequences of these mudstone facies. All Frio depositional systems contain economically significant, geologically defined hydrocarbon-producing plays. Volume, production style, and type of hydrocarbon within each of 10 recognized plays reflect source-rock quality and type, differing compaction and pore-fluid-migration history, and reservoir and trap configurations characteristic of each depositional system. Analysis of volumetric, historical, and geological relationships for production and discovery within each play provides a basis for estimating the undiscovered hydrocarbon resource potential as well as for assigning that potential to specific geographic and stratigraphic subdivisions of the depositional basin. 76 figures, 15 tables.

31188 **(SAND—82-2766C) Investigation on the accuracy and reliability of in-situ stress measurements using hydraulic fracturing in perforated cased holes.** Warpinski, N.R. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 5p. (CONF-830605—1). NTIS, PC A02/MF A01. Order Number DE83003276.

From 24. symposium on rock mechanics; College Station, TX, USA (20 Jun 1983).

At present, the only viable technique for accurately measuring stresses at depth in a borehole is hydraulic fracturing. These have been termed microfracs because very small amounts of fluid are injected at low flow rates into the formation. When the well is shut in, the pressure immediately drops from the injection pressure to the instantaneous shut-in pressure (ISIP) which is approximately equal to σ/sub min/. In general, the ISIP can be measured quite accurately in open holes. For most oil and gas applications, however, it is impossible or impractical to conduct these tests in an open-hole environment. The effects of the casing, cement annulus, explosive perforation damage, and random performation orientation are impossible to predict theoretically, and laboratory tests are usually conducted under nonrealistic conditions. A set of in situ experiments was conducted to evaluate the accuracy and reliability of this technique, to aid in the selection of an optimum perforation schedule, and to develop a diagnostic capability from the pressure response.

31189 **Surface detection during drilling of oil-well drill-bit failure using krypton-85.** Fries, B.A. (Chevron Research Co., Richmond, CA (USA)). pp 100 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/75P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31190 **Enhanced oil recovery by displacement with saline solutions.** Houston, TX; Gulf Publishing Company (1979). 156p. (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

The papers presented at the symposium dealt mostly with the displacement of crude oil by saline solutions of polymers and surfactants. Two enhanced oil recovery (EOR) methods were pointed out as having the best potential for EOR in the North Sea. These are micellar/polymer flooding and carbon dioxide miscible flooding. The eight papers in this proceedings have been abstracted and indexed for the Energy Data Base. (ATT)

31191 **Engineer's view of enhanced oil recovery.** Dawe, R.A.; Wall, C. (Royal School of Mines, London, England). pp 1-10 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

From the petroleum engineers point of view any systematic application of enhanced recovery techniques in large scale reservoirs seems many years away. Minor exceptions may be the use of surfactants to clean up water injection wells, and possible ad hoc operations implemented on the basis that they are not likely to do any harm. In neither case is much useful information likely to emerge. A systematic planned enhanced recovery operation requires very much knowledge of and insight into, interfacial phenomena in porous media than is presently available. Research into pore structure, oil entrapment and mobilization needs to start with the simplest of definable capillary systems and pore models. The description of real porous media in terms of realistic pore models and behavior is necessary to the understanding of displacement experiments in porous packs. Ad hoc experiments of fluid A displacing fluid B will not advance the state of the art. Much of this work lies in the field of physical and colloid chemistry and much of this may be best carried out by physicists or chemists free of the inhibitions and scepticism of the practical petroleum engineer. A great deal of development of mathematical modeling will regrettably be necessary, and this development should be subject to all the scepticism that the practical engineer can bring to bear on the problem. In the long term then this country may have the ability and the skills to apply practical schemes of enhanced recovery to mature oil fields. Regrettably the men with the ability and the skills will probably be working outside the territorial limits of the UK, and the grasp of the Inland Revenue. 6 figures.

31192 **Effect of surfactant phase behavior and interfacial activity on the recovery of capillary-trapped residual oil.** Hesselink, F.T. (Shell Exploration and Production Lab., Rijswijk, Netherlands). pp 11-21 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

Surfactant flooding is a tertiary recovery technique to produce capillary-trapped residual oil left behind by a waterflood. This oil can be mobilized by injection of suitable surfactant solutions. In contact with residual oil and brine, this surfactant forms a microemulsion phase, consisting of oil swollen by brine and surfactant to 2 to 3 times its original volume. This microemulsion phase has extremely low (approx. 10^{-3} dyne/cm) interfacial tensions against both oil and brine. Because of these very low interfacial tensions, residual oil is mobilized, forming an oil bank ahead of the surfactant slug, whereas very little oil is left behind in the flooded portion of the reservoir (eg. S/sub orc/ $\leqq$ 0.02 - 0.05). The oil bank grows continually in volume during displacement through the reservoir until it reaches the production well. Then the oil is produced. In this paper these principles are illustrated with data on the phase behavior and interfacial activity of some surfactant systems and on displacement tests in which residual oil is recovered using these surfactant systems. 6 figures.

31193 **Adsorption and desorption of Triton X100 in sand packs.** Nut, C.W. (Heriot-Watt Univ., Edinburgh, Scotland); Bayat, M.G.; Burley, R.; Bale, T.J.; Todd, A.C. pp 22-34 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

This study resulted from a realization that while the use of foam had certain advantages over more traditional fluids in the field of enhanced oil recovery, economics evaluation of its applicability would be quantified only when the sorption characteristics of such a system were known. The direct losses of surfactant to the particular strata by absorptive processes need to be known before any meaningful results may be obtained from the use of foam in large scale enhanced oil recovery operations. Well-characterized sands were used in static and dynamic studies to determine the sorption behavior of the surfactant, Triton X100, from aqueous solutions. It was found, in the static tests, that the isotherms approximated to the Langmuir type with a well-defined upper limit to the amount absorbed, corresponding to fluid phase concentration of 200 ppM or greater. It was also found that the limiting absorption increased linearly with temperature, indicating a change in molecular configuration in the sorbed monolayer. At room temperature the absorption proceeds at a moderate speed and does not fall off until at least two hours have elapsed. Under dynamic conditions the response is a wave-form of an initially increasing amplitude. This indicates how the response is a function, not only of absorption, but also of fluid mixing in the bed. Subsequently experimental technique and mathematical analysis had to be adapted to resolve absorption and fluid behavior effects. These are discussed with the aid of graphs.

31194 **Petroleum displacement in porous media by saline micellar solutions.** Grist, D.M.; Buckley, P.S. (BP Research Centre, Sunbury-on-Thames, England). pp 35-52 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

The purpose of this study was to understand why micellar fluids are so efficient in laboratory flooding tests and in some field tests. The micellar fluid systems investigated displaces residual oil in a porous medium by the following mechanism: (1) Downstream of the oil bank formed by the micellar fluid, brine alone is flowing. (2) Near the micellar fluid front an oil bank exists. Residual oil displacement then occurs when contact and coalescence with the flowing ganglin in this oil bank occurs. The brine saturation in the oil bank immediately ahead of the micellar fluid is at a minimum value. (3) The micellar fluid has a lower mobility than oil and a very low interfacial tension with respect to oil which it therefore primarily displaces ahead of itself. Immobile brine from the oil bank is absorbed into the micellar fluid thus diluting it progressively at the displacing front. (4) Oil not displaced is entrained in the micellar fluid flow because the low interfacial tension permits drop distortion and momentum transfer from the viscous displacing fluid. As the fluid viscosity falls this entrainment effect takes place further back in the slug (upstream). (5) The rear end of the micellar fluid slug is penetrated by brine or polymer solution and this is the most important cause of slug break-up. This penetration may be restricted in cases where the micellar fluid viscosity rises on dilution. A similar mechanism occurs in an oil wettable porous system although oil is not so readily entrained in this case.

31195 **Waterflood improvement by means of alkaline water.** Minssieux, L. (Inst. Francais du Petrole, Paris, France). pp 75-89 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

The objective of the study is to clarify the criteria and the conditions for using the alkaline type additives, starting from an understanding of the main physico-chemical mechanisms which play a role in the recovery of crude oil by the injection of NaOH. Injec-

tion of alkaline water is but one of the processes within the improved oil recovery methods. Provided that the oil in place is sufficiently reactive with the caustic, the process is more efficient than the injection of water alone. The process is interesting from the point of view of using a chemical which is readily available and causes little concern over pollution. The improvement in recovery with caustic results mainly from the combined actions of two mechanisms: decrease in the interfacial tension of oil-water; increase in the wettability to water of the reservoir rock surfaces. Consequently, the recovery will depend at the same time, both on the composition of the crude oil and the mineralogical nature of the reservoir rock. It should be mentioned again that this type of additive may be used in carbonates as well as with brines, but, up to now, we have not tested these additives with salinities higher than sea water.

31196 **Crude oil/water interfacial properties: emulsion stability and immiscible displacement.** Brown, C.E.; Neustadter, E.L.; Whittingham, K.P. (BP Research Centre, Sunbury-on-Thames, England). pp 91-122 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

Equipment built to measure oil/water interfacial properties is described. Oil/water interfacial viscosity and compressibility data are presented and the relevance of these results to crude oil emulsion stability and oil/water immiscible displacement is discussed. Various aspects of immiscible displacement behavior are discussed with reference to results from a photomicrographic study of a crude-oil-water/glass capillary system. 12 figures.

31197 **Flow of dilute polymer solutions through porous beds.** Jones, W.M. (Univ. Coll. of Wales, Aberystwyth). pp 123-137 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

In slow flow when inertial effects are absent, a maximum occurs in the flow resistance curve as a function of rate of flow. The apparent viscosity (μ/sub a/) of the solution can be as high as twenty times the viscosity (μ/sub p/) determined in a conventional viscometer. The ratio μ/sub a//μ/sub p/ increases as the pore size diminishes, increases with increasing concentration, increases with increasing molecular weight. This paper is concerned mainly with the interpretation of the effect, which is related to the extra dissipation of energy in extending the molecules periodically as flow goes through constriction after constriction in the porous media. 8 figures.

0204 Processing

REFER ALSO TO CITATION(S) 31048, 31201

31198 **Use of radioisotopes for studying the products of petroleum refining.** Brafman, M.; Guttierrez, M. (Centre de Recherche de Solaize, Societe Nationale Elf Aquitaine, France). pp 478 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/94P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

0205 Products And By-products

REFER ALSO TO CITATION(S) 31205

31199 **(NP—3901185) Petroleum chemistry 81.** (Esso Chemie G.m.b.H., Koeln (Germany, F.R.)). May 1982. 12p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901185.

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The development of the chemical industry in the F.R. of Germany during the past decade is illustrated by the help of some selected figures. At the same time, the whole spectrum of petrochemical products is shown. The information brochure consists of numerous tables and graphs.

31200 **(NP—3901289) Studies on the synthesis of lubricating oils using olefins from technical C_8-fractions.** Sust, C. (Technische Hochschule Aachen (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 2 Feb 1981. 152p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83901289.

Portions are illegible in microfiche products; Thesis.

Experiments on the production of synthetic lubricating oils were carried out using olefins from the C_8 distillate of a refined gasoline and Friedel-Crafts catalysts. The diesel fuels obtained as by-products have been used for alkylation of diphenyl methane. Oils with similar viscosity characteristics as conventional oils were obtained in satisfactory yields.

0206 Health And Safety

REFER ALSO TO CITATION(S) 32607

0207 Marketing And Economics

REFER ALSO TO CITATION(S) 31174, 31181, 31199, 31852, 31866, 31894, 31900

31201 **(AD-A—122825/3) Impact of petroleum, synthetic and cryogenic fuels on civil aviation. Final report.** Blake, C.L. (Federal Aviation Administration, Washington, DC (USA). Office of Systems Engineering Management). Jun 1982. 210p. NTIS, PC A10/MF A01.

Partial contents of this report are: World and Long-Term Energy View; U.S. Aviation in the Fuel Market; U.S. Petroleum Forecasting; Enhanced Oil Recovery (EOR); Petroleum Refining and Aviation Fuels; Natural Gas; Synthetic Fuels for Aviation; Cryogenic Fuels and Other; Aviation Propulsion; Alternative Ground Fuels and Energy Sources; Fuel Conservation in Aviation and Disruption of U.S. Crude Oil Imports.

31202 **(DOE/EIA—0109(83/03)) Petroleum Supply Monthly.** (USDOE Energy Information Administration, Washington, DC). Mar 1983. 87p. NTIS, PC A05/MF A01. Order Number DE83010198.

Information on the supply and distribution of petroleum and petroleum products in the US during January 1983 is presented. Data on the following subjects are included: supply and disposition of crude oil and petroleum products by PAD Districts; production of crude oil and lease condensate; natural gas processing; refinery operations by PAD Districts; imports and exports of crude oil and petroleum products; stocks; transportation of crude oil and petroleum products between PAD Districts; and heavy fuel oils by sulfur content. (DMC)

31203 **(DOE/EIA—0109(83/04)) Petroleum supply monthly.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Apr 1983. 77p. NTIS, PC A05/MF A01. Order Number DE83011093.

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Data are presented on US petroleum and petroleum products supplies and distribution for February, 1983. Data include: national statistics; supply and disposition of crude oil and petroleum products by PAD districts; production of crude oil and lease condensate; natural gas processing; refinery operations by PAD district; imports and exports of crude oil and petroleum products; stocks; transport of crude oil and petroleum products between PAD districts; and heavy fuel oil by sulfur content. (DMC)

31204 **(DOE/EIA—0208(83/15)) Weekly petroleum status report.** (USDOE Energy Information Administration, Washington, DC). 15 Apr 1983. 29p. NTIS, PC A03/MF A01. Order Number DE83010884.

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Information is presented on the petroleum supply situation in the US for the four-week period ending April 8, 1983. Data are also included for the years 1981 and 1982 on refinery operations, stockpiles, imports, world crude oil prices and spot market prices of gasoline, residual fuel oil, and No. 2 heating oil.

31205 **(NP—3901184) Annual report 1981.** (Mineraloelwirtschaftsverband e.V., Hamburg (Germany, F.R.). Arbeitsgemeinschaft Erdoel-Gewinnung und- Verarbeitung). 1981. 114p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901184.

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This annual report of the Mineral Oil Trade Association contains first a general valuation of petroleum economy's situation and of petroleum's position within energy economy being increasingly confined by oil replacement policy. This is followed by detailed interpretation of numbers for 81 more which are compiled in a comprehensive table work at the end of this report. Other chapters treat the effects of environmental and traffic policy, tax and other new laws.

31206 **OPEC and the oil-importing states in the 1980s (with a note on Mexico): economic, political, and security relations.** Moran, T.H. (Georgetown Univ., Washington, DC). pp 479-500 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

The conventional wisdom now sees a weak world oil market in which OPEC will not regain its strength and oil consumers are justified in an attitude of complacency. Whether OPEC power is really broken, how OPEC price and production decisions will be made, and how oil supplies relate to political and security relations of producer and consumer states are the questions behind this analysis of OPEC behavior. The conclusion is that market weakness is temporary and that prudent oil-consumers will continue replacement-cost pricing, stockpiling, and strengthening international cooperation. Economics alone do not explain OPEC price and production behavior, which responds to US political and mid-east policies. A note on Mexico suggests that the US must help Mexico to solve its unemployment and trade deficit problems to keep it from a too-rapid expansion of oil and gas exports as a way to develop revenues. 20 references, 2 figures, 3 tables. (DCK)

31207 **Review-surfactant processes, disparaties between laboratory and pilot studies analyzed.** Stewart, G. (Heriot-Watt Univ., Edinburgh, England). pp 53-73 of Enhanced oil recovery by displacement with saline solutions. Houston, TX; Gulf Publishing Company (1979). (CONF-7705190—).

From Symposium on enhanced oil recovery by displacement with saline solutions; London, UK (20 May 1977).

Because of the greater depth of engineering expertise applied to the problem of the National Petroleum Council (NPC) report must be considered more reliable than the Gulf Universities Research Consortium (GURC) or Lewin studies and hence is the best current estimate of US Enhanced Oil Recovery (EOR) potential. The base case potential of 13.2 billion barrels ($15, 10%) represents respectively: 3% of OOIP; 4.5% of ROIP; and 11% of physically recoverable target. At an oil price of $25 per barrel and the same return potential is 24 billion barrels and these percentages become 5.5%, 8.1% and 20% respectively. The publication of these figures in the United States at the end of 1976 served to mark the end of what is best described as a period of over-optimism concerning the prospects of enhanced oil recovery. The NPC findings have resulted in the injection of a note of economic realism into the proceedings and have sounded a warning to the nation that another significant increase in the real price of oil will occur. Of course the projections do not allow for major technological breakthroughs in regard to the efficiency of existing EOR methods or to entirely new techniques. For enhanced recovery to yield substantial quantities of oil two major conditions must be satisfied: (a) the element of risk must be eliminated so that companies will initiate schemes at lower anticipated returns; and (b) there must be an improved economic situation such as a higher oil price than at present. The role of government legislation will be crucial in both these aspects. 5 figures.

0208 Waste Management

31208 **(CONF-8206182—1) Waste management options for PCBs.** Fradkin, L.; Barisas, S. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83010566.

From Mid-Atlantic industrial waste conference; College Park, MD, USA (27 Jun 1982).

Various waste treatment, recycling, and disposal techniques for PCB's are briefly described. Included are chemical destruction processes, incineration, electromagnetic radiation, hydrothermal decomposition, and filters. (ACR)

31209 **(CRWR—92) Solid wastes in the petrochemical industry. Technical report EHE-72-14.** Makela, R.G.; Malina, J.F. Jr. (Texas Univ., Austin (USA). Center for Research in Water Resources). Aug 1972. 97p. Univ. of Texas, Center for Research in Water Resources, 10100 Burnet Road, Austin, TX 78758.

The conclusions presented in this section are based on extensive literature review and personal participation in a survey of solid waste management practices in the petrochemical industry conducted by the Texas Water Quality Board in 1970 to 1971. Quantitative data are not available. (1) Published information and data regarding solid waste production in the petrochemical industry is limited and somewhat difficult to obtain. (2) Petrochemical plants producing solid wastes keep some records of waste types and volumes, but in many instances no records are available. (3) Land disposal and incineration are the most common types of solid waste disposal methods. Land disposal is less costly and more convenient than incineration and is therefore more often used. Land disposal methods employed in the petrochemical industry are listed in order of frequency of occurrence: pit disposal, lagooning, open dumping, modified landfill, sanitary landfill, and spreading on land. (4) Incineration is usually reserved for those wastes too toxic or too heavily contaminated for land disposal. (5) Most solid waste disposal facilities have been haphazardly built and operated. (6) Recently installed disposal facilities tend to be better designed and operated. (7) Waste disposal methods such as ocean dumping and open dumping in pits and lagoons will be curtailed in the near future and be replaced by disposal methods such as sanitary landfill and incineration which are environmentally more acceptable. Also, recycling and reuse of waste materials will increase as the cost of waste disposal increases. (8) As treatment and disposal of technology becomes more complicated and costly, more industries will contract with privately owned disposal companies to haul wastes to regional facilities owned by the same or other private companies. 59 references, 21 figures, 6 tables.

0209 Environmental Aspects

REFER ALSO TO CITATION(S) 32489

31210 **(PB—83-152306) Determine fates of several oil spills in coastal and offshore waters and calculate a mass balance denoting major pathways for dispersion of the spilled oil. Final report.** Gundlach, E.R.; Boehm, P.D. (Research Planning Inst., Inc., Columbia, SC (USA)). Dec 1981. 33p. NTIS, PC A03/MF A01.

The ultimate fate of oil spilled in the ocean has received much scientific and public attention and still remains inadequately understood. Conceptionally, numerous mass-balance models have been offered to illustrate the various pathways associated with spilled oil. The purpose of this paper is to analyze the results of scientific investigations of some of the major oil spills of the past to determine the level of our quantitative understanding of these oil dispersal and reaction pathways.

31211 **(PB—83-155374) Performance of oil industry cross-country pipelines in Western Europe - statistical summary of reported spillages, 1981.** Heys, P.; Panisi, C.; Schaefer, H.; van Strien, W. (Concawe, The Hague (Netherlands)). [nd]. 36p. NTIS, PC A03/MF A01.

This report is one of a series of annual reports reviewing the performance of oil industry cross-country pipelines in Western Europe. It includes details of the pipeline network to which it refers, and analyses reported spillage incidents by cause and effectiveness of clean up. Causes are categorized as: mechanical failure, operational failure, corrosion, natural hazard and third party activity. The report concludes with a five-year comparison and trend analysis of reported spillages. It contains an overall map of the Western European oil industry cross-country pipeline system and more detailed maps of the pipeline networks of the Le Havre-Paris, Rotterdam-Europoort and Northern Italy areas.

0210 Legislation And Regulation

REFER ALSO TO CITATION(S) 31205

31212 **(DOE/IG—0155) Unnecessary costs incurred in constructing oil pipelines for the Strategic Petroleum Reserve.** (USDOE Office of Inspector General, Washington, DC). 11 May 1981. 46p. USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830.

Report to The Secretary.

Where audits determined that decisions to accelerate the construction schedule for earlier completion of oil pipelines to fill the Strategic Petroleum Reserve as rapidly as possible resulted in unnecessary cost, the IG recommended that SPRO reevaluate existing construction schedules; ensure that any accelaration will serve a useful purpose; and reach advance agreement with contractors on the additional costs to be incurred. (PSB)

31213 **(DOE/IG—0168) Need for departmental action to distribute funds in escrow accounts resulting from petroleum-pricing violations.** (USDOE Office of Inspector General, Washington, DC). 30 Jul 1981. 37p. USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830.

Report to The Secretary.

Where review showed that DOE should formulate a uniform policy for the disbursement of $350 million held in escrow accounts resulting from settlements for violations of petroleum pricing regulations, recommendations were made that the Department seek special legislation to provide for the deposit of these escrow funds directly into the Miscellaneous Receipts Account of the US Treasury. In the interim, the Department should consider formulating uniform procedures for: (1) disbursing funds in escrow accounts, including time frames for acting on the procedure adopted, and (2) using special refund procedures (10 C.F.R., Part 205, Subpart V), when appropriate, in an expeditious manner. The absence of such a policy, coupled with the inherent difficulty of disbursement decisions, seems to explain both the delay of action and the controversy over the few disbursements that have been made. While action recently increased, a definitive policy is needed to expedite and provide authoritative direction to the disbursement process. The Controller agreed with the recommendations. The Economic Regulatory Administration and Office of Hearings and Appeals disagreed. Their comments on the draft of the report are appended. (PSB)

0230 Properties

31214 **(DOE/BETC/PPS—83/1) Motor gasolines, Summer 1982.** Shelton, E.M. (Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center). Mar 1983. 70p. NTIS, PC A04/MF A01. Order Number DE83011418.

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The samples were collected from service stations throughout the country and were analyzed in the laboratories of various refiners, motor manufacturers, and chemical companies. The analytical data for 796 samples of motor gasoline, were submitted to the Bartlesville Energy Technology Center for study, necessary calculations, and compilation under a cooperative agreement between the Bartlesville Energy Technology Center (BETC) and the American Petroleum Institute (API). They represent the products of 22 companies, large and small, which manufacture and supply gasoline. These data are tabulated by groups according to brands (unlabeled) and grades for 17 marketing districts into which the country is divided. A map included in this report, shows marketing areas, districts and sampling locations. The report also includes charts indicating the trends of selected properties of motor fuels since 1959. Sixteen octane distribution percent charts for areas 1, 2, 3, and 4 for unleaded antiknock index (R + M)/2 below 90.0, unleaded antiknock index (R + M)/2 90.0 and above, leaded antiknock index (R + M)/2 below 93.0, and leaded antiknock index (R + M)/2 93.0 and above grades of gasoline are presented in this report. The antiknock (octane) index (R + M)/2 averages of gasoline sold in this country were 87.3 for unleaded below 90.0, 91.7 for unleaded 90.0 and above, 89.0 for leaded below 93.0, and no data in this report for 93.0 and above grades of leaded gasoline.

31215 **(DOE/BETC/PPS—83/2) Aviation turbine fuels, 1982.** Shelton, E.M.; Dickson, C.L. (Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center). Mar 1983. 13p. NTIS, PC A02/MF A01. Order Number DE83010848.

Properties of some aviation turbine fuels marketed in the United States during 1982 are presented in this report. The samples represented are typical 1982 production and were analyzed in the laboratories of 14 manufacturers of aviation turbine (jet) fuels. The data were submitted for study, calculation, and compilation under a cooperative agreement between the Department of Energy (DOE), Bartlesville Energy Technology Center (BETC), Bartlesville, Oklahoma, and the American Petroleum Institute (API). Results for the properties of 90 samples of aviation turbine fuels are included in the report for military grades JP-4 and HP-5, and commercial type Jet A.

31216 **(NP—3901281) Investigations to characterize hydrogenation products made of bituminous coal.** Beyer, H. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 18 Jul 1979. 135p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901281.

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Investigations on the structure and characterization of the composition of coal hydrogenation products was made and compared to the corresponding investigations of a petroleum sample. The colloid precipitation with acetic acid ethyl ester and the solubility analysis were compared to one another for three coal products and a petroleum sample. Both methods gave approximately the same result in the distillate from the coal hydrogenation and petroleum. More asphaltene was obtained with solid coal products by the solubility analysis than by an acetic ester precipitation. Both separation methods are more effective for petroleum than for coal products.

0240 Storage

REFER ALSO TO CITATION(S) 31212

31217 **(AD-A—123584/5) Petroleum fuel facilities. design manual 22. Final design criteria.** (Naval Facilities Engineering Command, Alexandria, VA (USA)). Aug 1982. 178p. NTIS, PC A09/MF A01.

Design criteria are presented for use by qualified engineers in designing liquid fueling and dispensing facilities. Included are basic requirements for the design of piping systems, pumps, heaters, and controls; the design of receiving, dispensing, and storage facilities; ballast treatment and sludge removal; corrosion and fire protection; and environmental requirements.

0250 Combustion

REFER ALSO TO CITATION(S) 31145

03 NATURAL GAS

REFER ALSO TO CITATION(S) 31018

0302 Geology And Exploration

REFER ALSO TO CITATION(S) 31187

0303 Drilling, Production, And Processing

REFER ALSO TO CITATION(S) 31188

31218 **Substantially self-powered method and apparatus for recovering hydrocarbons from hydrocarbon-containing solid hydrates.** Barraclough, B.L.; Elliott, G.R.; Vanderborgh, N.E. (to Dept. of Energy). US Patent 4,376,462. 15 Mar 1983. Filed date 19 Feb 1981. vp.

PAT-APPL-235775.

A method and apparatus are provided for producing gaseous hydrocarbons from formations comprising solid hydrocarbon hydrates located under either a body of land or a body of water. The vast natural resources of such hydrocarbon hydrates can thus now be economically mined. Relatively warm brine or water is brought down from an elevation above that of the hydrates through a portion of the apparatus and passes in contact with the hydrates, thus melting them. The liquid then continues up another portion of the apparatus, carrying entrained hydrocarbon vapors in the form of bubbles, which can easily be separated from the liquid. After a short startup procedure, the process and apparatus are substantially self-powered.

0304 Products And By-products

REFER ALSO TO CITATION(S) 31074

0306 Marketing And Economics

REFER ALSO TO CITATION(S) 31202, 31894

0309 Artificial Stimulation

REFER ALSO TO CITATION(S) 31183

31219 **(DOE/BC/10038—27) Lightweight proppants for deep-gas-well stimulation. Third annual report, July 1, 1981-June 30, 1982.** Cutler, R.A.; Enniss, D.O.; Swartz, G.C.; Jones, A.H. (Terra Tek, Inc., Salt Lake City, UT (USA)). Apr 1983. Contract AC19-79BC10038. 113p. NTIS, PC A06/MF A01. Order Number DE83012462.

The need exists for lower-density, less-expensive proppants for use in hydraulic-fracturing treatments. Ceramics, fabricated as fully sintered or hollow spheres, are the best materials for obtaining economical proppants with adequate strength. Fabrication techniques are described for fabricating solid-porcelain proppants and hollow-ceramic proppants. Porcelain proppants made by mix-pelletization techniques have good characteristics for propping wells with closure stresses to 96.5 MPa (14,000 psi). The properties of porcelain proppants are compared with twelve commercially available or experimental proppants. Several of the proppants evaluated had adequate conductivity for most hydraulic-fracturing jobs and are less expensive than bauxite. A single-fluid nozzle, counter-current spray-drying technique was used to make hollow, spherical proppants. Alumina was used as the ceramic raw material for these spray-drying experiments, but the same technique can be used with other ceramic materials. Hollow proppants with strengths comparable to sand have been spray dried but further optimization of spray drying parameters is needed to achieve proppants with concentric voids and improved strength. Bauxite, mullite, alumina and mullite rods were fast fired in a plasma in order to see if it is feasible to sinter these materials rapidly. Fast firing appears to be an alternative method of sintering proppants and may reduce costs, thereby making proppants more cost competitive with sand. 42 figures, 20 tables.

31220 **(DOE/MC/11843—1351) Study of explosive stimulation in Devonian-shale gas wells.** Loving, F.A.; Simmons, W.J. (Du Pont de Nemours (E.I.) and Co., Martinsburg, WV (USA). Potomac River Development Lab.). Nov 1980. Contract AC21-79MC11843. 28p. NTIS, PC A02/MF A01. Order Number DE83007402.

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A comparison of explosive treatments in eight Devonian shale wells in Union District, Putnam County, WV is presented. Intervals of about 600 ft were shot with (1) 5-inch-diameter gelatin dynamite (6000 lb in 6-1/4 inch hole), (2) EL836 aluminized water gel explosive (12,000 lb in 6-1/4 inch hole) and (3) EL836 in an underreamed hole (37,500 lb in a 12-inch hole). Final open-flow data after treatment indicate substantially larger gas flows from the heavier charge-per-foot treatments. 2 figures, 2 tables.

0330 Properties

31221 **(PB—83-161398) Assessment of data availability, quality, and needs for the gas industry. Final report Apr 81-Mar 82.** Hall, K.R. (Texas A and M Univ., College Station (USA). Research Foundation). 30 Apr 1982. 9p. NTIS, PC A02/MF A01.

The objective of this project is to perform an exhaustive literature search covering the thermodynamic properties of natural gas and syngas components and their mixtures. Coupled with this retrieval is a preliminary evaluation of the data intended to indicate areas requiring experimental attention. The task division is: pure components, Texas AandM University; phase equilibrium, NBS (Boulder); mixtures, University of Oklahoma; transport properties, Purdue University.

31222 **(PB—83-161414) Heat capacity measurements on structure I and II pure hydrates at low pressures and below room temperature. Final report Oct 81-Sep 82.** Callanan, J.E.; Sloan, E.D. (National Bureau of Standards, Boulder, CO (USA)). Sep 1982. 35p. NTIS, PC A03/MF A01.

World resources of natural gas in hydrate form are on the order of trillions of cubic meters. Thermophysical property measurements are vital to the determination of the exploitability of this resource. The natural gas hydrates are clathrates; the hydrate lattice exists in one of two special structures (I and II), both of which are different from any of the known forms of ice. The hydrate lattice forms with cavities or cages in which molecules in specific size ranges can be trapped. Heat capacities as a function of temperature and, where appropriate, heats of dissociation have been measured for tetrahydrofuran (II), ethylene oxide (I), and cyclopropane (I and II) hydrates by differential scanning calorimetry. The heat capacities were found to vary both with structure and with guest. Scanning calorimetric techniques and sample handling techniques suitable for dealing with hydrates in the subambient region were developed.

0340 Combustion

REFER ALSO TO CITATION(S) 31145

04 OIL SHALES AND TAR SANDS

REFER ALSO TO CITATION(S) 31018

0401 Reserves And Exploration

31223 (ANL—82-62, pp 392-406) **X-ray absorption measurement of fluid saturations in oil sand cores.** Miles-Dixon, E.; Sedgwick, G.E.; Heidrick, T.R. (Alberta Research Council, Edmonton). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The Alberta Research Council has embarked on a major program of physical and numerical simulations to investigate the in situ recovery of bitumen from the province's large oil sands deposits. One such process uses steam heating to extract the bitumen directly from the unconsolidated sands. Mathematical modelling of this process, which is based on experimental results, requires a knowledge of physical properties of porous media, such as the relative permeability to various types of fluid flow. This permeability depends on the relative amount of each fluid flowing in a multicomponent mixture during the experiment. A number of techniques are being explored to accurately measure these component fractions at the required high temperatures and pressures. These include x-ray and γ-ray absorption, computerized tomography, radiotracers, and neutron activation. In this paper data are presented for sand packs with varying saturations of bitumen and aqueous solutions of sodium iodide. Sodium iodide was selected to increase the absorption contrast between the bitumen and water phases. Data are also included for longitudinal scans of cylindrical sand packs showing the variations of chordal average absorption with length during a flooding or displacement process. Scans are shown for both miscible and immiscible displacement fronts.

0404 Oil Production, Recovery, And Refining

REFER ALSO TO CITATION(S) 31231, 31232

31224 (ANL—82-62, pp 682-691) **In situ recovery of bitumen from oil sands: laboratory pilot plant experience.** Nguyen, D.M.; Heidrick, T.R. (Alberta Research Council, Edmonton). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The Alberta Research Council has played a major role in developing the technology of recovery bitumen from Canada's oil sands deposits. Initially a process was developed for oil recovery from mined sands. More recently effort has focused on methods suitable for deposits that are too deep to be profitably mined. The oil must be recovered from these deposits in place (in situ). To support this in situ recovery research a full range of experimental facilities have been developed. Among these, are physical simulators which allow tests to be done at the high temperatures and pressures characteristic of in situ recovery conditions. Tests run on these simulators provide the data base for development and verification of numerical reservoir models that are used to estimate the field performance of various processes. The important question is: why work with laboratory simulators at all when field pilots provide the ultimate test for any recovery process? The answer is that field pilot operations are expensive and time consuming. Experiments which are properly designed and conducted in physical simulators allow screening of a wide variety of recovery parameters at moderate costs in time and money. The physical simulators described in this paper are three dimensional elemental models. The oil sand simulator system consists of three major components: an injection system, a test cell, and a production system. The system is detailed along with a description of the test instruments and the significance of the measurements.

31225 (SAND—82-2936C) **Analysis of Occidental vertical modified-in-situ retorts 7 and 8.** Bickel, T.C. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 15p. (CONF-830434—2). NTIS, PC A02/MF A01. Order Number DE83009797.

From 16. oil shale symposium; Golden, CO, USA (13 Apr 1983).

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These retorts were extensively instrumented, commercial size retorts (50 m x 50 m x 75 m) that were processed concurrently at Occidental's Logan Wash site near Debeque, Colorado. Retorts 7 and 8 each contained 340,000 tonnes of rubble with rubble voids of 18.5%. Average shale grades were 72 l/tonne (17.2 gpt) and 70 l/tonne (16.8 gpt) for Retorts 7 and 8, respectively. Also, material balance calculations provided real time values of combustion losses, shale retorted and oil produced. Calculated coal yields averaged 52% during the processing of both retorts. Retorts 7 and 8 were processed ~ 300 and ~ 330 days, respectively, providing an excellent data base for post-burn analyses. Sweep efficiencies were 81% and 89% for Retorts 7 and 8, respectively. Thermal data also indicates extensive retorting occurred beyond the rubble boundary (~ 25% of initial rubble mass). Energy balances show an energy utilization of 0.33 kg shale retorted/mole O_2 injected for Retort 7 and 0.37 kg shale retorted/mole O_2 injected for Retort 8. 24 figures, 4 tables.

31226 (SAND—82-2964C) **Material-balance technique for analysis of in-situ oil-shale retorting.** Major, B.H.; Hommert, P.J. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 14p. (CONF-830434—3). NTIS, PC A02/MF A01. Order Number DE83009084.

From 16. oil shale symposium; Golden, CO, USA (13 Apr 1983).

Data essential for the evaluation of in situ oil shale retorts are the amount of shale retorted and the magnitude of various oil degradation mechanisms. These quantities, especially the former, can be difficult to estimate for field experiments. A material balance technique has been developed that can be used with product analyses to determine both shale retorted and oil loss to combustion. The technique relies on a combination of standard concepts of material balance and stoichiometry specific to oil shale retorting. Key parameters within the technique are estimated from laboratory data to allow the approach to be extended to field situations. Application of the technique to recent field results from Geokinetics and Occidental show that the yield from these tests appears to be greater than that previously reported. This is due, in all likelihood, to inadequate accounting of potential liquid product produced in the gas phase. 6 figures, 5 tables.

31227 (UCRL—88492) **Median residence and dispersion times for fluidization of crushed oil shale.** Christiansen, D.E.; Mallon, R.G. (Lawrence Livermore National Lab., CA (USA)). 24 Mar 1983. Contract W-7405-ENG-48. 9p. (CONF-830434—4). NTIS, PC A02/MF A01. Order Number DE83010364.

From 16. oil shale symposium; Golden, CO, USA (13 Apr 1983).

Median residence times and dispersions for crushed oil shale flowing downward through a fluidized bed were measured as a function of particle size, nominal residence time, and fluidizing gas velocity. For fluidized beds containing narrow particle-size distribution, it was found that median residence time and dispersion increase with nominal residence time, decrease with increasing gas velocity, and show mixed results with change in particle size. The results for fluidized beds of broad particle-size distribution were different. Increasing the nominal residence time increased the median residence time but had no regular effect upon dispersion. The gas velocity was observed to have a strong effect upon dispersion but little effect upon median residence time. When particle-size effects in this broad particle-size bed were investigated, it was found that the finer particles had a longer median residence time and were more widely dispersed than the coarser particles. 10 figures.

31228 (UCRL—88524) **Vertical pneumatic conveying of mixed-particle-sized oil shale.** Quong, R. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 19p. (CONF-830434—6). NTIS, PC A02/MF A01. Order Number DE83010530.

From 16. oil shale symposium; Golden, CO, USA (13 Apr 1983).

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Solid flow characteristics of mixed-sized oil shale in vertical pneumatic conveyers were investigated using a 47.6-mm-diameter lift-pipe. The shale was in a crushed and spent condition with a

particle size range of 0.074 to 3.36 mm. Components of the pressure gradient in established flow were measured over a range of gas velocities and solid fluxes. Size-dependent particle velocities were also indirectly measured and shown to depend on solid flow rates. Particle velocity dependence is described by experimentally generated expressions for the range of particle sizes studied. In this system for conveying mixed-sized shale, particle velocities were found not to be predictable from terminal or free-fall velocities which were also measured. The aggregate solids velocity, which is computed from the single-sized particle-velocity relations, permits a reasonably accurate prediction of solids pressure drop. Use of a solids friction factor, estimation of choking velocity, and characteristics of the acceleration length are also discussed. 18 figures, 4 tables.

0405 Properties And Composition

REFER ALSO TO CITATION(S) 31064, 31145, 31223

31229 (ANL—82-62, pp 280-290) **Time-domain measurements of the dielectric properties of oil shale: the development of an on-line dielectric probe.** Iskander, M.F. (Univ. of Utah, Salt Lake City). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

A time-domain technique for measuring the dielectric properties of oil shale is described. This technique provides complete dielectric characterization of the oil shale over a broad frequency band from a single measurement. A small shunt capacitor terminating a coaxial transmission line is used as a sample holder. For high temperature measurement the sample holder was constructed of Kovar to minimize the measurement errors due to the differential thermal expansion of the 50-ohm coaxial transmission line and the sample holder. A procedure to determine the optimum value or values of the capacitance of the sample holder is also discussed. The development of the on-line dielectric probe which utilizes an open-ended section of the transmission line as a sample holder is described. The on-line probe has an extended center conductor which is embedded in the dielectric volume under test. It is shown that although the initial results from the on-line dielectric probe are encouraging, further work is still required to fully develop the probe for in-situ measurements.

31230 (UCRL—88505) **Attrition of spent oil shales during pneumatic conveying and cyclone separating.** Carley, J.F. (Lawrence Livermore National Lab., CA (USA)). Apr 1983. Contract W-7405-ENG-48. 22p. (CONF-830434—5). NTIS, PC A02/MF A01. Order Number DE83010362.

From 16. oil shale symposium; Golden, CO, USA (13 Apr 1983).

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Retorted and burnt shales prepared from rich and lean raw shales were blown through a 6-m vertical lift pipe and a small cyclone separator at gas velocities of 15 and 30 m/s, passing through the system either once or ten times. Size distributions of feeds and cyclone-bottom products were measured, as were those of some of the cyclone-top dusts. Aspect ratios of particles from the feedstocks and selected products were measured with the Quantimet 720. The size distributions of all the materials were downshifted during gasifying and cycloning, the lean, retorted shale only slightly, the rich, burnt material most severely. The new exterior surface area generated through attrition, estimated from the drag-mean particle size, rose as the square of the gas velocity and the 0.7 power of the number of passes. The aspect-ratio studies showed that the attritted particles were more rounded than the feeds and became more so with increasing gas velocity and repeated passes. This evidence, and the character of the size-distribution shifts, shows that the main mechanism of attrition of these materials is the breaking away and abrasion of asperities. Particle loading had no effect at all upon any of the size-distribution parameters or new-surface generation. This finding implies that attrition occurred by contact between particles and equipment walls rather than by interparticle collisions. It should therefore be less severe in larger equipment. 22 figures, 5 tables.

0408 Marketing And Economics

31231 (ANL—82-62, pp 6-11) **Shale oil: present and future.** Gary, J.H. (Colorado School of Mines, Golden). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Political considerations affect shale oil development greater than any one other factor and these are almost impossible to predict with any degree of certainty. Instead, a look at the characteristics of the technical and economic aspects of shale oil production will give an idea of the feasibility of a shale oil industry. Most of the companies involved in oil shale development are planning to produce a hydrogenated shale oil called hydrogenating raw shale oil to Syncrude. Syncrude is a premium quality crude oil because it has low sulfur, nitrogen, and metals contents and very little high boiling material. Syncrude has an initial boiling point of about 350 F and an end point about 1000 F. This means there is very little gasoline in Syncrude but most is in the diesel and jet fuel boiling ranges. These fractions require very little upgrading to produce a satisfactory product. Union and Amoco have developed catalysts that can convert all of the shale oil directly to diesel and jet fuel by hydrogenation. The cost of producing Syncrude from oil shale is estimated to range from $30 to $42 per barrel depending on the location, the process, and the estimator. This would be competing with sweet crudes selling in the $35 to $38 range. The disadvantages of shale oil as compared with crude oils are the long lead times required tax discrimination in favor of conventional crude oils, the unresolved environmental issues, and the strong vocal resistance of relatively small anti-technology groups. The significant advantages of shale oil production include no finding costs, large shale resources in the Rocky Mountain Area with recoverable amounts of oil equal to the world's conventional crude oil reserves, secure access in time of national defense, high yields of middle distillates which are critical for national defense, and a decrease in the federal balance of payments deficit because of displacement of purchases of foreign crude.

0409 Waste Research And Management

REFER ALSO TO CITATION(S) 31230, 31232

0410 Enviromental Aspects

31232 (LBL—14468) **Control technology for in-situ oil-shale retorts.** Persoff, P.; Fox, J.P. (Lawrence Berkeley Lab., CA (USA)). Mar 1983. Contract AC03-76SF00098. 126p. NTIS, PC A07/MF A01. Order Number DE83011012.

The object of this study was to evaluate control technologies for groundwater pollution resulting from leaching of modified in-situ spent shale. Preliminary engineering analysis was used to identify control technologies which were technically feasible and cost-effective. Process modification, intentional leaching, and retort grouting were further evaluated using numerical modeling and experimental techniques. Numerical simulation of the geohydrology at tracts C-a and C-b was used to determine the flow regime during and after processing, the amount of water available from dewatering, and the time scale of groundwater reinvasion. It was found that reinvasion would take over 200 years and that dewatering flows would probably be insufficient to satisfy water requirements for retort grouting. The formulation of low-cost grouts based on surface-retorted spent shale was studied experimentally. A high-strength hydraulic cement was produced by calcining Lurgi spent shale with an equal amount of $CaCO_3$ at 1000 C for 1 h. Electrical conductivity measurements indicated that the leachate from a grouted retort would be more concentrated than that from an ungrouted retort, but the increase in concentration would be more than offset by the reduction in flow. A standard flow-cone test used for grouting of preplaced aggregate concrete was used as the criterion for grout fluidity. This criterion was achieved by inclusion of either 33 percent sand or 0.25 percent lignosulfonate fluidizer in the grout. These grouts were found to be Casson fluids with yield stress values about 60 dyne/cm^2. Intentional leaching of MIS re-

torts was evaluated by developing a mass-transfer model of the leaching process. The model was experimentally verified for total organic carbon and used to calculate that 2.1 to 3.4 pore volumes would be needed to reduce leachate concentrations to 10 percent of their initial value.

05 NUCLEAR FUELS

0501 Reserves

31233 (INIS-mf—7475(Vol.A), pp 1-416) **Brazilian uranium reserves.** Marques, J.P.M. (NUCLEBRAS, Rio de Janeiro (Brazil)). 1981. (In Portuguese). NTIS (US Sales Only), PC A19/MF A01. (CONF-8104136—Vol.A.).

From 2. Brazilian energy congress; Rio de Janeiro, Brazil (6 Apr 1981).

Due to a growing demand of electric power to support Brasil's development, the use of nuclear energy will be indispensable. The nuclear fuel cycle for the production of energy, starts with the uranium exploration. The work performed in this field led to the discovery of several deposits in the country, which to-date totalize a reserve of 236,300t of U_{3O8}, ranking Brazil in the 6th place among the nations of the western world holding uranium reserve.

0502 Exploration

31234 (DOE/GJ/01692—T2) **Airborne gamma-ray spectrometer and magnetometer survey: Indian Wells, Texas. Final report. Detail area, Volume IIA.** (High Life Helicopters, Inc., Puyallup, WA (USA); QEB, Inc., Lakewood, CO (USA)). 1980. Contract AC13-79GJ01692. 223p. NTIS, PC A10/MF A01. Order Number DE83011285.

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Volume IIA contains appendices for: stacked radiometric profiles; geologic histograms; geochemical histograms; speed and altitude histograms; geologic statistical tables; geochemical statistical tables; and magnetic and ancillary profiles. (ATT)

31235 (DOE/GJ/01692—T3) **Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report, detail area Volume IID.** (High Life Helicopters, Inc., Puyallup, WA (USA); QEB, Inc., Lakewood, CO (USA)). [nd]. Contract AC13-79GJ01692. 179p. NTIS MF A01. Order Number DE83011306.

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Volume IID contains appendices for the following: flight line maps; geology maps; explanation of geologic legend; flight line/geology maps; and geochemical analysis maps.

31236 (DOE/GJ/01692—T4) **Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report. Detail area, Volume IIE.** (High Life Helicopters, Inc., Puyallup, WA (USA); QEB, Inc., Lakewood, CO (USA)). [nd]. Contract AC13-79GJ01692. 342p. NTIS, PC A15/MF A01. Order Number DE83011307.

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Volume IIE contains appendices for: radiometric contour maps; magnetic contour maps; and multi-variant analysis maps. (ATT)

31237 (DOE/GJ/01692—T5) **Airborne gamma-ray spectrometer and magnetometer survey: Indian Wells, Texas. Final report. Detail area, Volume IIB.** (High Life Helicopters, Inc., Puyallup, WA (USA); QEB, Inc., Lakewood, CO (USA)). [nd]. Contract AC13-79GJ01692. 95p. NTIS, PC A05/MF A01. Order Number DE83011286.

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Volume IIB contains appendices for: flight line maps; geology maps; explanation of geologic legend; flight line/geology maps; radiometric contour maps; magnetic contour maps; geochemical factor analysis maps. (ATT)

31238 (DOE/GJ/01692—T6) **Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report. Detail area, Volume IIA.** (High Life Helicopters, Inc., Puyallup, WA (USA); QEB, Inc., Lakewood, CO (USA)). 1980. Contract AC13-79GJ01692. 586p. NTIS, PC A25/MF A01. Order Number DE83011302.

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Volume IIA contains the following information: geology; radioactive mineral occurrences in Texas; geophysical data interpretation; references; and appendix A on stacked radiometric profiles. (ATT)

31239 (DOE/GJ/01692—T7) **Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report, detail area Volume IIC.** (High Life Helicopters, Inc., Puyallup, WA (USA); QEB, Inc., Lakewood, CO (USA)). [nd]. Contract AC13-79GJ01692. 138p. NTIS MF A01. Order Number DE83011284.

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Volume II contains appendices for: geologic histograms; geochemical histograms; speed and altitude histograms; geologic statistical tables; geochemical statistical tables; and test line data.

31240 (NP—3901761) **Regional hydrodynamics and hydrochemistry of the uranium-bearing Oakville aquifer (Miocene) of south Texas. Report of investigations No. 124.** Smith, G.E.; Galloway, W.E.; Henry, C.D. (Texas Univ., Austin (USA). Bureau of Economic Geology). 1982. 33p. Bureau of Economic Geology, Univ. of Texas, Austin, TX 78712.

The Oakville Formation consists of sediments deposited by several major fluvial systems that traversed the Texas Coastal Plain during the Miocene Epoch. Facies geometry and composition, together with superimposed structure and topography, are important determinants of ground-water flow, aquifer transmissivity, and regional hydrochemical evolution. Topographically high areas along the Oakville outcrop are ground-water recharge zones. Downdip movement of ground water is deflected along strike into major incised stream valleys and modified by local ground-water pumping, resulting in discharge of Oakville water from relatively shallow sections of the aquifer. Discharge from local and intermediate-scale flow cells, as well as influx along growth faults of high-salinity water from deeper stratigraphic horizons, is readily shown by field phenomena. Introduction of exotic evolved connate waters is demonstrable by the distribution of sulfate, chloride, and reduced sulfur species. Shallow Oakville ground waters exhibit a clearly defined compositional change from predominantly sodium chloride waters in the southwest to calcium bicarbonate waters in the northeast. Redox potential (Eh) of Oakville ground water decreases from +470 mV (oxidizing) to -170 mV (reducing) with increasing depth and coincides with an increase in pH and tempertaure. Dissolved oxygen content exhibits an inverse relationship to Eh and reduced sulfur. Higher recharge in the northeast results in a deeper subsurface penetration of oxygenated ground waters. The regional distribution of trace amounts of uranium, molybdenum, selenium, and arsenic in Oakville ground water demonstrates a good correlation with known sites of uranium mineralization, and defines elevated trace metal contents unrelated to known uranium occurrences. These same elements exhibit an overall increased background level in the southwestern section of the study area. 26 figures, 1 table.

31241 (SAND—83-0346) **Elevated-temperature tests on the prompt-fission-neutron logging tool.** Stephenson, W.A. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 23p. NTIS, PC A02/MF A01. Order Number DE83011340.

A PFN Tool was tested at temperatures from 27 to 93°C. Neutron output and epithermal-neutron detection data fall off at higher tempertures, but thermal-neutron dieaway measurements were unaffected by these temperatures. In nine hours of testing at various tempertures two neutron generators, a diode, and a transistor failed.

0504 Feed Processing

31242 **(GJBX—21(83)) Extraction of uranium low-grade ores from Great Divide Basin, Wyoming. National Uranium Resource Evaluation.** Judd, J.C.; Nichols, I.L.; Huiatt, J.L. (Bureau of Mines, Salt Lake City, UT (USA). Salt Lake City Research Center). Apr 1983. Contract AC13-76GJ01664;AI13-81GJ01699. 18p. NTIS, PC A02/MF A01. Order Number DE83011313.

The US Bureau of Mines is investigating the leachability of carbonaceous uranium ore samples submitted by the DOE under an Interagency Agreement. Studies on eight samples from the Great Divide Basin, Wyoming, are the basis of this report. The uranium content of the eight ore samples ranged from 0.003 to 0.03% U_3O_8 and contained 0.7 to 45% organic carbon. Experiments were performed to determine the feasibility of extracting uranium using acid leaching, roast-acid leaching and pressure leaching techniques. Acid leaching with 600 lb/ton H_2SO_4 plus 10 lb/ton $NaClO_3$ for 18 h at 70°C extracted 65 to 83% of the uranium. One sample responded best to a roast-leach treatment. When roasting for 4 h at 500°C followed by acid leaching of the calcine using 600 lb/ton H_2SO_4, the uranium extraction was 82%. Two of the samples responded best to an oxidative pressure leach for 3 h at 200°C under a total pressure of 260 psig; uranium extractions were 78 and 82%.

31243 **(GJBX—22(83)) Extraction of uranium from low-grade ore from Red Desert, Wyoming. National Uranium Resource Evaluation.** Judd, J.C.; Nichols, I.L.; Huiatt, J.L. (Bureau of Mines, Salt Lake City, UT (USA). Salt Lake City Research Center). Apr 1983. Contract AC13-76GJ01664;AI13-81GJ01699. 19p. NTIS, PC A02/MF A01. Order Number DE83011304.

The US Bureau of Mines, under an Interagency Agreement with the Department of Energy, conducted characterization studies on the extraction of uranium from a Red Desert, Wyoming, carbonaceous silty mudstone. The characterization study included acid and carbonate leaching, roasting, autoclaving, pugging, and ferric salt leaching tests. The various leach processes tested produced 87% U_3O_8 extraction using the acid amenability process, 67% using the carbonate amenability leach process, and 83% using the roast and leach process. A cost study would be necessary to determine the economic feasibility of using this ore body for future uranium production. 11 tables.

31244 **(GJBX—23(83)) Extraction of uranium from low-grade ore from McDermitt, Nevada.** Judd, J.C.; Nichols, I.L.; Huiatt, J.L. (Bureau of Mines, Salt Lake City, UT (USA). Salt Lake City Research Center). Apr 1983. Contract AC13-76GJ01664;AI13-81GJ01699. 13p. NTIS, PC A02/MF A01. Order Number DE83011314.

The US Bureau of Mines is investigating uranium ore samples submitted by the Department of Energy under an Interagency Agreement. One sample from McDermitt, Nevada, containing 0.0875 pct U_3O_8, is the basis of this report. Leaching studies were performed to determine the feasibility of extracting uranium from this ore body. Acid leaching with 400-lb H_2SO_4/ton of ore and 10-lb $NaClO_3$/ton of ore extracted 84 pct of the U_3O_8 from the ore. When the ore sample was roasted for 4 hr at 500°C followed by an acid leach, extraction of U_3O_8 was 90 pct; the required acid addition was 400-lb H_2SO_4/ton of ore. Extraction of U_3O_8 was 93 pct when pressure leached under oxygen in an autoclave at 260 psig, 200°C for 3 hrs using 400-lb H_2SO_4/ton of ore. Carbonate leaching at 85°C extracted 50 pct of the U_3O_8, but the oxidant requirement was 20-lb $KMnO_4$/ton of ore. Roasting of the ore followed by a carbonate leach of the calcine increased the extraction of U_3O_8 to 70 pct. 7 tables.

0505 Enrichment

REFER ALSO TO CITATION(S) 32900

31245 **(DOE/NBM—3011272) Uranium enrichment. 1982 annual report.** (USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Uranium Enrichment and Assessment). 1982. 30p. NTIS, PC A03/MF A01. Order Number DE83011272.

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Continuity of supply, cost containment, and customer relations are covered in the 1982 Uranium Enrichment annual report

31246 **(INIS-mf—7475-Vol.A, pp vp) EURODIF: the uranium enrichment by gaseous diffusion.** Rougeau, J.P. (Societe EURODIF, 92 - Bagneux (France)). 1981. NTIS (US Sales Only), PC A19/MF A01. (CONF-8104136—Vol.A).

From 2. Brazilian energy congress; Rio de Janeiro, Brazil (6 Apr 1981).

During the seventies the nuclear power programme had an extremely rapid growth rate which entailed to increase the world uranium enrichment capacity. EURODIF is the largest undertaking in this field. This multinational joint venture built and now operates and enrichment plant using the gaseous diffusion process at Tricastin (France). This plant is delivering low enriched uranium since two years and has contracted about 110 million SWU's till 1990. Description, current activity and prospects are given in the paper.

0506 By-products

31247 **(AD-P—000006/7) Laboratory testing of long rod penetrator and sabot components.** Scavullo, M.A.; Underwood, J.H. (Army Armament Research and Development Command, Watervliet, NY (USA). Large Caliber Weapon Systems Lab.). Sep 1982. 17p. NTIS, PC A02/MF A01.

Laboratory testing apparatus is described which can be used to simulate the launch loading of penetrator and sabot components from kinetic energy penetrator rounds. Load and deflection to failure of production components has been measured and compared for different materials and configurations. Results are described from penetrators made from a uranium alloy and two tungsten alloys. Results from sections of sabots are described, including two aluminum alloys and different configurations.

0507 Fuels Production And Properties

REFER ALSO TO CITATION(S) 32074

31248 **Flaw detection and evaluation.** Sturges, R.H.; Wilks, R.S. (to Dept. of Energy). US Patent 4,377,238. 22 Mar 1983. Filed date 27 Aug 1980. vp.

PAT-APPL-181567.

The invention provides a method of and apparatus for optically inspecting nuclear fuel pellets for surface flaws. The inspection system includes a prism and lens arrangement for scanning the surface of each pellet as the same is rotated. The resulting scan produces data indicative of the extent and shape of each flaw which is employed to generate a flaw quality index for each detected flaw. The flaw quality indexes from all flaws are summed and compared with an acceptable surface quality index. The result of the comparison is utilized to control the acceptance or rejection of the pellet.

0508 Spent Fuels Reprocessing

REFER ALSO TO CITATION(S) 31275, 31277, 31304, 32221, 32279

31249 **(AGNS—35900-1.1-170) Studies and research concerning BNFP: evaluation of spent-fuel-examination techniques for the Barnwell Nuclear Fuel Plant.** Anderson, R.T.; Gray, J.H.; Rogell, M.L. (Allied-General Nuclear Services, Barnwell, SC (USA)). Sep 1982. Contract AC09-78ET35900. 83p. NTIS, PC A05/MF A01. Order Number DE83011350.

A study was made of various examinations which could be remotely performed on a production basis with spent fuel at the Barnwell Nuclear Fuel Plant (BNFP). These techniques could form an integral portion of fuel disassembly and canning operations.

Their benefits accrue to either improved fuel storage, reprocessing, or both. In conjunctoin with these studies, evaluations have been made of the operational impact of receiving failed or canned fuel at the BNFP.

31250 **(KFK—3290) Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.** (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Wiederaufarbeitung und Abfallbehandlung). Mar 1982. 276p. (In German). NTIS (US Sales Only), PC A13/MF A01. Order Number DE83750259.

The lectures presented to this meeting deal with the concept of waste disposal in the Federal Republic of Germany, the current state and results of the development work within the project 'Reprocessing and Waste Management'. The main efforts and technological programmes are described as well. Further lectures have been held on problems relating to a fuel reprocessing plant (dissolver-off-gas treatment, tritium separation, hydraulic studies on pulsating columns, electroreduction in the PUREX process, analytical procedures for process analyses). Moreover, materials problems have been discussed and the monitor development for criticality control, work for improving remote handling devices, and the reprocessing of a KNK II reactor mixed oxide fuel in the laboratory test plant MILLI. Separate abstracts were prepared for individual items.

31251 (KFK—3290, pp 21-32) **Achievements and current activities of the Reprocessing and Waste Project (PWA).** Kroebel, R. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

This lecture deals with the most important results and activities of the Reprocessing and Waste Management Project at the Karlsruhe Nuclear Research Centre; the project comprises basic research and development work towards semi-industrial scale, as well as safety engineering problems studied within the framework of a coordinated research and development programme carried out with the 'Deutsche Gesellschaft zur Wiederaufarbeitung'. The problems dealt with include the process engineering of the dissolver off-gas treatment (aerosols, iodine, fission noble gas) pilot plants for the PUREX-process (electrolytic processes in the reduction and oxidation of plutonium, tritium washing column, pulsating column plant MILTESSA, laboratory reprocessing plant MILLI for fast breeder fuel elements); waste conditioning (solidification, wet ashing of waste containing plutonium); process analyses and control as well as developments concerning safety (remote handling engineering, fire protection and other things). Finally, the cooperation with other partners in Germany and in foreign countries is discussed.

31252 (KFK—3290, pp 33-51) **Main activities and achievements of the DWK within the joint development programme.** Kuhn, K.D.; Sahm, A. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

In a coordinated development programme for the construction of fuel cycle centres, the DWK (Deutsche Gesellschaft fuer Wiederaufarbeitung) has the task to apply the experience gained by KfK and WAK to the planning and finally to the operation of industrial plants. In addition, the work carried out by DWK is aimed at finding solutions for safety engineering and economy problems in order to be able to cope with the requirements of the next decade. The main efforts thus are studies on spent fuel storage, especially head-end problems and detailed problems in the first coextraction cycle of the PUREX-process with components testing, development work for improving the safety of the reprocessing plant (instrumentation, H_2 radiolysis), and finally the vitrification of high-level radioactive waste (PAMELA-plant).

31253 (KFK—3290, pp 52-72) **State of the development work for the reprocessing of fuel elements used in advanced reactors.** Ebert, K. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

The reprocessing of fast breeder type reactor elements is, contrary to LWR-type reactor elements, very much determined by differences in burn-up, cooling period and fissile material content. For the application of the PUREX process therefore a series of problems arise where development work but also basic research have to be done. Remote controlled maintenance in connection with the head-end, dissolution of the mixed oxide, extraction process where the laboratory plant MILLI is used with a flow rate of 1 kg per day, influencing the process dynamics and radiation damage of the extraction material by means of appropriate choice of the extraction medium, waste minimization and waste-gas management are some of the efforts of the development work of which a short outline is given.

31254 (KFK—3290, pp 119-139) **Filters for aerosol and iodine seperation from the dissolver off-gas of a future reprocessing plant.** Wilhelm, J.G.; Furrer, J.; Kaempffer, A.; Linek, A. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

For a future German reprocessing plant a dissolver off-gas line is developed at Karlsruhe Nuclear Research Centre, for which the separation of suspended matter and iodine is tested in the pilot plant PASSAT. For a pre-separation of droplets and solid aerosols, a remote-handled fibre package separator has been developed which can be backwashed when installed and which has such dimensions that it fits into a waste barrel and can be removed without any problem. The decontamination factors achieved are above 1,000 for droplet and solid aerosols under suitable differential pressures. Iodine separation is carried out by means of chemical sorption on a special filter containing iodine sorption material and in contrast to the wet scrubbing process, produces a solid, storable product in a single step. It has been possible to gain valuable experience and to obtain data for interpreting a head-end off-gas system.

31255 (KFK—3290, pp 140-148) **Reprocessing of KNK II reactor fuel rods at the MILLI plant.** Bleyl, H.J.; Ochsenfeld, W. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

To demonstrate a closed fuel cycle with recycling of uranium and plutonium, a KNK II reactor fuel element with a burn-up of 1.3% after a decay period of about 23 months has been reprocessed in the MILLI laboratory extraction plant according to the PUREX process. Three extraction cycles have been used; first, a coordination cycle with uranium and plutonium as end products; secondly, a uranium/plutonium separation cycle with the plutonium fraction as end product, and thirdly a remote-controlled decontamination cycle for the uranium end product. The uranium or plutonium end products have been used for refabrication. Details of reprocessing are described, and the operating results of this process are reported.

31256 (KFK—3290, pp 149-167) **Experiments concerning mass transfer and the hydraulic optimization of an originak mixer-settler chamber for tritium separation in a reprocessing plant.** Bauer, H.; Eiben, K.; Evers, H.; Finsterwalder, L.; Klonk, H.; Schieferdecker, B. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

It is intended to stop the spreading of tritium into the product phases in solvent extraction by means of tritium scrubbing in a mixer-settler following fission product scrubbing. The experiments described have the purpose to gain operating experience and data for the design and dimensioning of a multistage mixer-settler for tritium scrubbing in a reprocessing plant. For this purpose an experimental scrubbing stage in original size rated throughput: 4 t uranium/d) has been built in which the optimum hydraulics (development of a suitable pump-mixer-equipment) and also the efficiency of the mass transfer of tritium had been measured. According to the results, the decontamination factor which can be achieved and which has been studied using deuterium depends not only on the ratio of H_2O to HNO_3 in the organic phase; H_2O and HNO_3 are

driven out of the organic phase with increasing uranium concentration and this makes tritium scrubbing more efficient.

31257 (KFK—3290, pp 168-183) **Hydraulic studies concerning sieve plates and valve trays of pulsating columns.** Klonk, H.; Evers, H.; Zimmermann, H. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

By means of a test facility with pulsating extraction columns the effects of varying sieve plate geometries and materials have been studied with the purpose of obtaining optimum extraction efficiency. The wetting behaviour of the individual phases is of great importance. For the organic-continuous mode of operation, which is preferred, the material of the plates should be organic-wetting, so that a good distribution of the aqueous phase will be achieved. Sieve plates made of titanium, high-grade steel, plexiglass and teflon with 23% free cross-sectional area of the holes have been tested. With conic design (tuyere trays) and larger hole diameters (3 to 4.5 mm), reliable operation with good droplet formation was achieved even when hafnium was used.

31258 (KFK—3290, pp 184-201) **Modelling of electro-reduction in the PURES process.** Petrich, G.; Schmieder, H. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

A description is given of the development activities in the numerical simulation of the electrolytical reduction of plutonium in the PUREX process. In uranium-plutonium separation, it is difficult to calculate the concentration profiles of all partners involved in an extractor as the mechanism of the Redox reductions which superpose the extraction reactions is still not totally clear. The model equations which have the purpose of describing the various stages of a mixer-settler are preliminary simulation results obtained by the computer program VISCO for an electric mixer-settler are given.

31259 (KFK—3290, pp 202-216) **PUREX process analysis - status and trends.** Ertel, D. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

The work an analyst has to do in a reprocessing plant is the PUREX process analysis itself (i.e. constant monitoring with high numbers of analyses for materials- , activity-, and isotope concentrations, valence etc.), together with balance analyses (fuel element balancing, nuclear safeguards), and finally safety analyses (studies concerning nuclear accidents, corrosion, emissions, waste). An outline is given of the skeleton conditions resulting from the hot operation of the total facility, and the resulting problems of adapting methods and instruments as well as of the necessity of rationalisation and of increasing the quality of information are briefly outlined.

31260 (KFK—3290, pp 217-227) **Evaluation and presentation of analytical procedures for input analysis in reprocessing.** Mainka, E. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

Special attention is paid to the analysis of the nuclear fuel in the dissolver of a reprocessing plant. High activity, unfavorable U/Pu ratios, and the very complex plutonium chemistry (various valences together in the solution) make analyses difficult. Using the most important criteria of evaluation, the following methods are described: dilution analysis by mass spectroscopy, x-ray fluorescence analysis, isotope correlation, gamma absorptiometry, redox-titration, emission spectroscopy after plasma excitation, alpha-spectroscopy, and Laser-Raman spectroscopy.

31261 (KFK—3290, pp 264-276) **Selection, processing, and application of corrosion resistant plant materials for reprocessing of nuclear fuel elements.** Klonk, H.; Laudien, R.; Leistikow, S.; Kraft, R. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

The materials of PUREX process plant components are exposed as a rule to a nitric acid medium of medium concentration, in the temperature charged devices, for example a dissolver, to approx. equal to 7 mol/l nitric acid at boiling temperature at the most. Therefore attention has to be paid to materials and corrosion. In the chemical industry, austenitic chromium-nickel steels are commonly used for these applications. For use in reprocessing plants a number of austenitic materials have been studied with regard to their corrosion behaviour in hot HNO_3, and the reduction of selective corrosion symptoms by high-purity alloying components and alloying engineering measures has been recognized. The possibility of using special materials is discussed as well; titanium proves to be highly corrosion resistant even if the redox potential of the medium is very high.

31262 (LA-tr—83-7) **Adaptation of the continuous cold-trap system of fluidized-bed to the fluoride volatility process.** (Los Alamos National Lab., NM (USA)). 26 Jan 1976. Contract W-7405-ENG-36. Translation of JAERI-M-6405. 29p. NTIS, PC A03/MF A01. Order Number DE83011551.

Portions are illegible in microfiche products.

A continuous cold-trap system consisting of fluidized condensor and stripper has been evaluated with a view to adapt it to the Fluoride Volatility Process in establishing the continuous purification process without radiation decomposition of PuF_6. Its feasibility is shown by the test with UF_6-air. Necessary conditions for the cold trap, and performance of the 2-in.-dia. fluidized-bed cold-trap system are presented, and also a model of mist formation in the condensor.

0509 Transport And Storage

REFER ALSO TO CITATION(S) 31273, 31302, 32231

31263 (DPST—82-433) **Bases for DOT exemption uranyl nitrate solution shipments.** Moyer, R.A. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Jul 1982. Contract AC09-76SR00001. 25p. NTIS, PC A02/MF A01. Order Number DE83011276.

Uranyl nitrate solutions from a Savannah River Plant reprocessing facility have been transported in cargo tank trailers for more than 20 years without incident during transit. The solution is shipped to Oak Ridge for further processing and returned to SRP in a solid metal form for recycle. This solution, called uranyl nitrate hexahydrate (UNH) solution in Department of Transportation (DOT) regulations, is currently diluted about 2-fold to comply with DOT concentration limits (10% of low specific activity levels) specified for bulk low specific activity (LSA) liquid shipments. Dilution of the process solution increases the number of shipments, the cost of transportation, the cost of shipper preparations, the cost of further reprocessing in the receiving facility to first evaporate the added water, and the total risk to the population along the route of travel. However, the radiological risk remains about the same. Therefore, obtaining an exemption from DOT regulations to permit shipment of undiluted UNH solution, which is normally about two times the present limit, is prudent and more economical. The radiological and nonradiological risks from shipping a unit load of undiluted solution are summarized for the probable route. Data and calculations are presented on a per load or per shipment basis throughout this memorandum to keep it unclassified.

31264 (K/C—1425) **Use of computers for meeting future challenges in traffic management.** Ford, C.L. Jr. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). 7 Apr 1983. Contract W-7405-ENG-26. 6p. (CONF-830528—1). NTIS, PC A02/MF A01. Order Number DE83010352.

From 7. international symposium on packaging and transportation of radioactive materials; New Orleans, LA, USA (15 May 1983).

Since overall distribution costs, including transportation, is approaching 10% of the material expense dollar, new strategies are emerging in distribution management. Innovative technology utilizing computer hardware and software is an aid to solving inventory

control and distribution problems. This paper discusses the information needs of the shipper traffic manager and the role of computers in meeting this need. DOE, in association with Union Carbide's Nuclear Division, has utilized data base technology to collect and report transportation statistics for a variety of management information needs.

31265 **(PNL—4517) Economics of at-reactor spent fuel storage alternatives.** Merrill, E.T.; Fletcher, J.F. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 80p. NTIS, PC A05/MF A01. Order Number DE83011417.

Estimates of costs that would be incurred by a utility providing enhanced storage capability for spent LWR fuel are presented. The cost data are arranged to assist in estimating and evaluating costs for specific storage situations. Estimated storage costs are provided in a series of tables providing cost factors or arrays for each alternative method of storage considered, and the additional costs involved in various options of pre-storage preparation of the fuel. Cost data are provided for (1) storage enhancement within an existing storage pool, by reracking and/or consolidation of fuel; (2) construction and use of an additional, separate water basin for storage; and (3) utilization of dry storage options. Costs are given for canning of integral assemblies and for consolidation and canning of fuel. In each case, the storage facilities are assumed to be located at an existing reactor site. If a separate site were to be utilized for storage, appropriate site development and maintenance costs would need to be added. The basic cost tables are tied togeter by a decision tree logic diagram designed to simulate the decision steps a utility planner might take in selecting from alternative storage technologies to best meet the requirements of his situation. Using the decision tree and its associated tables, example calculations were made to show the life cycle storage costs for a hypothetical case assuming a pressurized water reactor (PWR) site. The reactor was assumed to discharge 40 assemblies (18.4 MTU) of spent fuel each year; costs were estimated for storage periods of 1, 5, and 15 yrs, respectively. Discounted life cycle storage costs in thousands of dollars and unit costs in dollars per kilogram of initial uranium content are shown for this hypothetical site. Cost for spent fuel storage are dependent upon conditions at each reactor site and the most economical method is not expected to be the same at all sites.

0510 Marketing And Economics

REFER ALSO TO CITATION(S) 31265

0520 Waste Management

REFER ALSO TO CITATION(S) 31250, 31251, 31252, 31254, 31298, 31299, 31300, 31301, 31305, 31306, 32043, 32386, 32459, 32621, 32630, 32638, 32639, 32640, 32643, 32645

31266 (ANL—82-62, pp 540-547) **Hydrogeologic testing of the E.J. Kubat borehole, San Juan County, Utah: utilization of a high pressure instrumented flow control system.** Hoexter, D.F. (Woodward-Clyde Consultants, San Francisco, CA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

The E.J. Kubat borehole, located in San Juan County, Utah, in the SW 1/4, Section 23, T37S, R19E, was drilled in 1958 as a petroleum exploration (wildcat) well. Drilling records and geophysical logs were examined as a part of the Paradox Basin Project, a feasibility and siting study for a high-level nuclear waste repository to be located in bedded salt deposits in the Utah portion of the Paradox Basin. This project is part of the Department of Energy National Waste Terminal Storage Program, and is being conducted by Woodward-Clyde Consultants under subcontract to Battelle Memorial Institute, Office of Nuclear Waste Isolation. The geophysical logs of the Kubat and nearby wells showed that salt cycles potentially suitable as a possible repository horizon existed within the Pennsylvanian-age Paradox Formation in the area. Thus, it was decided to re-enter the well and extend it deeper into the Mississippian Leadville Limestone, the major water-bearing formation underlying the repository horizon. A series of hydrogeologic tests was conducted to evaluate hydrogeologic properties of the Leadville Limestone. These tests provided data on potentiometric level, transmissivity and permeability of the test interval. Although testing of relatively highly permeable formations is common, obtaining reliable data from formations of low permeability is more difficult, and is a special aspect of the paradox Basin Project.

31267 **(BMI-OCRD—1) National survey of crystalline rocks and recommendations of regions to be explored for high-level radioactive waste repository sites.** Smedes, H.W. (Battelle Memorial Inst., Columbus, OH (USA). Office of Crystalline Repository Development). Apr 1983. Contract AC02-83CH10140. 120p. NTIS, PC A06/MF A01. Order Number DE83010252.

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A reconnaissance of the geological literature on large regions of exposed crystalline rocks in the United States provides the basis for evaluating if any of those regions warrant further exploration toward identifying potential sites for development of a high-level radioactive waste repository. The reconnaissance does not serve as a detailed evaluation of regions or of any smaller subunits within the regions. Site performance criteria were selected and applied insofar as a national data base exists, and guidelines were adopted that relate the data to those criteria. The criteria include consideration of size, vertical movements, faulting, earthquakes, seismically induced ground motion, Quaternary volcanic rocks, mineral deposits, high-temperature convective ground-water systems, hydraulic gradients, and erosion. Brief summaries of each major region of exposed crystalline rock, and national maps of relevant data provided the means for applying the guidelines and for recommending regions for further study. It is concluded that there is a reasonable likelihood that geologically suitable repository sites exist in each of the major regions of crystalline rocks. The recommendation is made that further studies first be conducted of the Lake Superior, Northern Appalachian and Adirondack, and the Southern Appalachian Regions. It is believed that those regions could be explored more effectively and suitable sites probably could be found, characterized, verified, and licensed more readily there than in the other regions.

31268 **(DOE/ID/12180—T1) Planner's guide to low-level radioactive waste disposal. Planning Advisory Service report number 369.** Smith, T.P. (American Planning Association, Chicago, IL). Jul 1982. Contract AC07-81ID12180. 59p. NTIS, PC A04/MF A01. Order Number DE83011442.

Chapters are devoted to the basics of waste generation and management, transport of low-level radioactive wastes, treatment and disposal of low-level radioactive wastes, proposed siting standards for disposal facilities, state initiatives for waste management, and local government participation. Five appendices are included: definitions; summary of code and federal regulations for the transport of radioactive materials; DOT routing rules for radioactive materials (excerpt); proposed NRC site selection criteria; waste distribution by state; available films; and annotated bibliography.

31269 **(DOE/ID/12348—T5) Comprehensive low-level waste management plan for the State of Kentucky. Sixth quarterly report for the period ending March 31, 1983.** (Kentucky Natural Resources and Environmental Protection Cabinet, Frankfort (USA)). Apr 1983. Contract FG07-81ID12348. 28p. NTIS, PC A03/MF A01. Order Number DE83011113.

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Activities for this period have concentrated on working with the Low-Level Radioactive Waste (LLRW) Management Coordination Committee and participation in several workshops on the Midwest LLRW Regional Compact.

31270 **(DOE/NBM—3011069) Nevada nuclear waste storage investigations: briefing book.** (Department of Energy, Las Vegas, NV (USA). Nevada Operations Office). Mar 1983. 15p. NTIS, PC A02/MF A01. Order Number DE83011069.

The Nevada Nuclear Waste Storage Investigations (NNWSI) are discussed briefly. The tuff in Yucca mountains being investigated as a possible repository host for radioactive wastes. The Spent Fuel Test-Climax began in the spring of 1980 in the northeastern Nevada Test Site about 1400 ft below the desert surface. The test has provided significant scientific and technical contributions in the following areas: heat impact on a large underground facility in a hard, brittle rock, impact of ventilation designs on repository heat removal, suitability and operational characteristics of instrumentation in a repository, impact of the mining procedures on underground openings and the surrounding rock, and heat and radiation effects on the physical, mechanical, and chemical properties of granite.

31271 (DOE/NV/00410—72) Assessment of change in shallow land burial limits for defense transuranic waste. Cohen, J.J.; Smith, C.F.; Spaeth, M.E.; Ciminesi, F.J.; Dickman, P.T.; O'Neal, D.A. (Science Applications, Inc., Pleasanton, CA (USA); Reynolds Electrical and Engineering Co., Inc., Las Vegas, NV (USA)). Mar 1983. Contract AC08-76NV00410. 75p. NTIS, PC A04/MF A01. Order Number DE83011474.

There is an emerging consensus within the waste management technical community that the current concentration limit of 10 nCi/g for shallow land burial (SLB) of transuranic (TRU) waste is excessively restrictive. A concentration limit for SLB in the range of 100 to 1000 nCi/g is reasonable and justifiable based upon these reasons: Resultant increase in collective radiation dose (total population dose) would be very small, and the net detriment to public health would be negligible. Increasing the limit is cost-effective and could save hundreds of millions of dollars for the national economy over time. The hazard resulting from the increased SLB limit for TRU would be significantly less than that due to many naturally occurring mineral deposits and/or human activities. Expenditures directed toward health and safety conform to the economic law of diminishing returns: as the absolute expenditure increases, the marginal return decreases. Excessive restriction of the TRU concentration limit for SLB needlessly diverts limited resources (time, talent, and money) from other areas of health and safety where they might be more beneficially applied. Despite considerable effort, this study did not find any compelling technical argument to maintain the limit for TRU in SLB at 10 nCi/g. Subsequent to the initial preparation of this document, the US Department of Energy issued DOE Order 5820 which raises the administrative disposal limit for transuranic wastes from 10 nCi/g to 100 nCi/g. In addition, the US Nuclear Regulatory Commission has subsequently proposed and adopted a revised version of regulation 10 CFR 61 in which the disposal limit for shallow land burial of Category C (intruder protected) waste is set at 100 nCi/g.

31272 (DOE/NWTS—147(1)) Implementation of technical conservatism in the development of nuclear waste repositories. (Battelle Memorial Inst., Columbus, OH (USA). Office of National Waste Terminal Storage Integration). Mar 1981. Contract AC06-76RL01830. 18p. NTIS, PC A02/MF A01. Order Number DE83011111.

The Department of Energy (DOE) waste management program is committed to assuring the safe disposal of radioactive waste. It is recognized that long-term disposal concepts will contain inherent uncertainties in predictive techniques and scientific information. Accordingly, conservative approaches ae being followed to enhance levels of confidence that the disposal system will perform in such a manner that the established performance requirements will be met. Limiting values of critical parameters will be established for each site based on its inherent characteristics prior to beginning site development. The performance limits will be established for each geometric region of the repository system and be applied simultaneously to assure that no single limit is violated over the repository life cycle. A site-specific set of specifications will be determined when the site is fully characterized, establishing a conservative design basis to increase confidence in safe system performance. The implementation of the NWTS program policy on technical conservatism, as discussed in this document, takes two forms--(1) conservatism in the conduct of the program and (2) conservatism in the performance of the disposal system. The first is achieved by a stepwise approach to system development and operation, the systems viewpoint, the retrievability requirement, and the extensive use of peer reviews throughout the conduct of the program. The second is achieved by the proper selection and application of conservative design and operational limits.

31273 (DOE/NWTS—147(2)) Technical conservatism in the design of a spent fuel repository in a generic bedded salt stratigraphy. (Battelle Memorial Inst., Columbus, OH (USA). Office of National Waste Terminal Storage Integration). Mar 1981. Contract AC06-76RL01830. 40p. NTIS, PC A03/MF A01. Order Number DE83011127.

This report illustrates an approach to quantitatively document the degree of technical conservatism incorporated into the design of a hypothetical geologic waste isolation system in a generic bedded salt stratigraphy. The report develops performance constraints for the critical barriers within each subsystem and for the system as a whole. The interface between integrity and loss of function is quantitatively defined for each performance constraint. A conservative margin is applied to this interface to arrive at a design basis. The waste isolation system design is then analyzed to ensure that the design bases are met for the effective lifetimes of each barrier. This approach enables the reader to scrutinize both the methodology and the design to determine for himself in the degreeof technical conservatism incorporated into the waste isolation design.

31274 (DPST—82-811) Solid-waste burning in the SWIFT. Farber, M.G. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Sep 1982. Contract AC09-76SR00001. 51p. NTIS, PC A04/MF A01. Order Number DE83012003.

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The Solid Waste Incineration Facility for Testing (SWIFT) has operated for 400 hours and burned 25,000 lb of waste. After the facility startup in October 1981, three week-long campaign runs were conducted. During these tests, the incinerator processed a wide variety of simulated (nonradioactive) waste at rates of 300 to 400 lb/h. The resulting ash reduced the storage volume of the waste by a factor of 20. The off-gas treatment successfully cooled the exhaust from 1000 to 180°C and filtered particulates from the gas stream. Cleaned off-gas was released to the atmosphere at 100°C. Monitoring of the exhaust gas determined that pollutant and particulate concentrations were below South Carolina and Federal limits. A few areas need improvement, such as more adequate ash removal, better temperature control, and reduced air in-leakage. Performance of the equipment and materials of concentration was very good with only minor exceptions. This report contains extensive information on incinerator operation and data from burning tests.

31275 (ENICO—1131) Evaluation of stainless steel tank corrosion in ICPP high-level radioactive waste service. Hoffman, T.L.; Norby, B.C.; Mizia, R.E.; Zimmerman, C.A. (Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-79ID01675. 42p. NTIS, PC A03/MF A01. Order Number DE83011033.

At the Idaho Chemical Processing Plant, Types 304L and 348 stainless steels were corrosion tested in raffinates from reprocessing spent nuclear fuels. After exposure to the raffinate solutions for periods up to 28.6 years total service time, maximum penetration rates observed on these stainless steels were 0.059 mil per year in aluminum-zirconium process first-cycle raffinate, and 0.0004 mil per year in second- and third-cycle raffinates.

31276 (EPRI-NP—2900) Low-level radwaste solidification. Tucker, R.F. Jr.; Nelson, R.A.; Miller, C.C. (Sargent and Lundy, Chicago, IL (USA)). Mar 1983. 215p. NTIS, PC A10/MF A01. Order Number DE83901972.

Low-Level Radwaste Solidification Topical Report characterizes radwaste solidification processes and systems currently in use and under development. The report identifies the types of waste, solidification agents, and general criteria which affect radwaste-solidification systems and processes. The chemistry and physics of the radwaste solidification processes are discussed along with a summary of several studies. The various radwaste-solidification processes and corresponding commercial radwaste-solidification systems are described. Radwaste shipping and burial containers, in-

cluding high-integrity containers, along with container handling and storage systems are briefly discussed and many of the commercially available containers are described. Other topics discussed include dry active waste (DAW) production, DAW processing techniques, and some of the commercial compaction equipment is described. Radwaste-packaging efficiencies for several commercial processes are also provided.

31277 **(Juel-ICT-IB—468/82) Disposal of tritiated effluents.** Hartmann, K.; Bruecher, H. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Chemische Technologie). Jun 1981. 217p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750026.

After some introductory remarks on the origin of tritium, its properties and its behaviour in a reprocessing plant three alternative methods for the disposal of tritiated effluents produced during reprocessing are described (deep well injection, in-situ solidification, deep-sea dumping) and compared with each other under various aspects. The study is based on the concept of a 1400 t/a reprocessing plant for LWR fuel, which annually produces 3000 m^3 of tritiated waste water with a tritium content of 6.5×10^{12} Bq/m^3 as well as a residual fission product and actinide content. An assessment of the three methods under the aspects of simplicity, reliability, safety, costs, state of development and materials handling revealed advantages in favour of 'injection', followed by 'dumping' and 'in-situ solidification'.

31278 (KFK—3290, pp 7-20) **German waste disposal concept: Current state and outlook on future activities.** Popp, M. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

First of all, an outline is given of the technical and political problems encountered in the development of the integrated final waste disposal concept of the Federal Republic of Germany. According to this concept the tasks of government and industry are clearly defined. It is the task of industry to construct and operate the waste disposal facilities including the treatment of radioactive wastes and the recycling of nuclear fuel which can be re-used; the government, however, is responsible for safe nuclear waste disposal and in fulfilment of this task has to rely on the cooperation with the nuclear research centres in the Federal Republic of Germany. Achievements and current activities towards the realisation of the individual steps of final waste disposal are explained, and the programme 'Other waste disposal technologies' aiming at direct final disposal of spent fuel elements is critically commented.

31279 (KFK—3290, pp 73-96) **Concept for the treatment of radioactive waste containing actinides.** Krause, H. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

There are large amounts of alpha-bearing waste and especially waste containing plutonium occurring in reprocessing plants and in fuel element fabrication. Compared to beta- and gamma-bearing waste, however, the quantity is still small but will increase considerably with increasing fabrication and subsequent reprocessing of breeder fuel elements. Up to now, there are no binding rules and specifications for the treatment of waste containing actinides, but all over the world considerable experience has been gained in this sector, which is outlined in this paper. The development work is pursued on the basis of the following criteria: waste minimization, separation of plutonium and other actinides whenever possible, and as complete recycling of plutonium as possible, embedding into a very stable matrix. The research and development work carried out at the 'Institut fuer Nukleare Entsorgung' of Karlsruhe Nuclear Research Centre are explained.

31280 (KFK—3290, pp 97-118) **German technology programme for HAW solidification.** Heimerl, W. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

The development work in the sector of HAW vitrification in the Federal Republic of Germany is coordinated in a programme, the 'Technology programme for HAW solidification', including corresponding activities carried out in Mol/Belgium. The HAW programme is fully compatible with the PAMELA project. As an alternative to the process used by the Ateliers de Vitrification Marcoule in France, it is intended to demonstrate in a technical plant efficiency of the PAMELA process as a result of German development work. This PAMELA plant is now under construction in the EUROCHEMIC in Mol. An outline is given of the PAMELA process and of the coordination of research and development work among the partners in the project, as well as of current activities and future tasks for 1982 and 1983.

31281 **(NUREG/CR—2482-Vol.2) Review of DOE waste-package program. Subtask 1.1. National waste-package program, September 1981-March 1982. Volume 2.** Soo, P. (comp.). (Brookhaven National Lab., Upton, NY (USA)). Apr 1983. Contract AC02-76CH00016. 127p. (BNL-NUREG—51494-Vol.2). NTIS, PC A07/MF A01 - GPO $6.00. Order Number DE83011735.

Parts 1 and 2 are indexed separately.

31282 (NUREG/CR—2482-Vol.2, pp 59p, Paper 1) **Near-field repository conditions in basalt and salt.** Siskind, B.; Hsieh, D. Apr 1983. NTIS, PC A07/MF A01 - GPO $6.00. (BNL-NUREG—51494-Vol.2).

In Review of DOE waste-package program. Subtask 1.1. National waste-package program, September 1981-March 1982. Volume 2.

The characteristics and properties of the near-field repository environment in basalt and salt host rock which are potentially important in the consideration of chemical and mechanical failure modes for the waste package and which provide necessary input for the evaluation of the performance of the individual waste package components and for the test evaluation of the waste package are summarized. Data are presented on the ranges of conditions found in potential basalt and salt host rocks; groundwater and brine parameters and host rock characteristics as well as perturbations in these variables caused by the heat and radiation from the waste package are all addressed. Based on the available information, in particular, the reference repository conditions selected for DOE by the Reference Repository Conditions Interface Working Group, a description is provided of the chemical and physical environment as it is seen or experienced by the waste package. For basalt, the reference values in the undistubed host rock at 1100-m depth for the temperature, hydrostatic and lithostatic pressures, pH and Eh are 50°C, 11 MPa and 33 MPa, 9.45 to 9.74, and < -0.3 V, respectively. After emplacement of the waste package, the near-field temperature will attain a projected maximum value of 300°C before cooling. The reference values for undisturbed salt at 600-m depth for temperature, lithostatic pressure, and pH are 34°C, 18 to 35 MPa, and 4 to 6.5, respectively. The maximum near-field temperature after emplacement of the waste package is projected to reach 156°C before cooling. The additional information about the near-field environment needed for a complete waste package licensing review are summarized.

31283 **(ONWI—9(82-4)) National Waste Terminal Storage Program. Technical progress report for the quarter 1 July-30 September 1982.** (Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). 1982. Contract AC06-76RL01830. 191p. NTIS, PC A09/MF A01. Order Number DE83012117.

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The National Waste Terminal Storage (NWTS) program was established in 1976 and given the responsibility of developing a system for the permanent isolation of nuclear wastes. NWTS is part of the Office of Nuclear Waste Management in the US Department of Energy. The establishment of NWTS signaled the acceleration of the national program. The purpose of the NWTS program is to develop the technology and facilities required for the disposal of commercial spent nuclear fuel, defense high-level waste, and transuranic waste, ensuring public health and safety and protection of the environment. The program includes facilities for receiving, encapsulation, and disposal of wastes. The scope of the NWTS reposi-

tory development effort includes comprehensive geologic exploration, technology development, equipment testing, and model verification activities, as well as the design, licensing, construction, operation, and decommissioning activities required to provide geologic repositories and spent fuel handling and packaging facilities. Development of the technology, methodology, and facilities for interim spent fuel storage, waste treatment, and waste transportation, which are interfacing activities with the terminal isolation activity in the national waste-management program, are being carried out in other DOE efforts.

31284 **(ONWI—420) DOT: a nonlinear heat-transfer code for analysis of two-dimensional planar and axisymmetric representations of structures.** (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 232p. NTIS, PC A11/MF A01. Order Number DE83011522.

One of the key issues related to location and design of a nuclear waste repository is the dissipation of the heat generated by the isolated waste. The Determination of Temperature (DOT) code is a general purpose finite element heat transfer code developed by Polivka and Wilson in 1976 at the University of California, Berkeley, that is appropriate for predicting thermal environments. The code deals with linear and nonlinear transient of steady-state heat conduction in two-dimensional planar or axisymmetric representations of structures. Capabilities are provided for modeling anisotropic heterogeneous materials with temperature-dependent thermal properties and time-dependent temperature, heat flux, convection and radiation boundary conditions, together with time-dependent internal heat generation. This documentation describes the mathematical model, solution techniques and computer code design. It also contains a detailed user manual. The use of DOT as an integrated part of the SCEPTER technology package has been emphasized throughout the report. Links with the thermomechanical codes MATLOC, VISCOT, and UTAH2 have been identified and described in detail, as have stand-alone applications of DOT and its use with the waste package performance assessment code WAPPA. Output from DOT consists of a steady-state temperature distribution or a set of nodal temperatures at various times for a transient problem. Strengths of the DOT code include its flexibility, wide range of possible boundary conditions, nonlinear material properties, and its efficient equation solution algorithm. Limitations include the lack of a three-dimensional analysis capability, no radiative or convective internal heat transfer, and the need to maintain a constant time step in each program execution.

31285 **(ONWI—429) SALT4: a two-dimensional displacement discontinuity code for thermomechanical analysis in bedded salt deposits.** (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 156p. NTIS, PC A08/MF A01. Order Number DE83011503.

SALT4 is a two-dimensional analytical/displacement-discontinuity code designed to evaluate temperatures, deformation, and stresses associated with underground disposal of radioactive waste in bedded salt. This code was developed by the University of Minnesota. This documentation describes the mathematical equations of the physical system being modeled, the numerical techniques utilized, and the organization of the computer code, SALT4. The SALT4 code takes into account: (1) viscoelastic behavior in the pillars adjacent to excavations; (2) transversely isotropic elastic moduli such as those exhibited by bedded or stratified rock; and (2) excavation sequence. Major advantages of the SALT4 code are: (1) computational efficiency; (2) the small amount of input data required; and (3) a creep law consistent with laboratory experimental data for salt. The main disadvantage is that some of the assumptions in the formulation of SALT4, i.e., temperature-independent material properties, render it unsuitable for canister-scale analysis or analysis of lateral deformation of the pillars. The SALT4 code can be used for parameter sensitivity analyses of two-dimensional, repository-scale, thermal and thermomechanical response in bedded salt during the excavation, operational, and post-closure phases. It is especially useful in evaluating alternative patterns and sequences of excavation or waste canister placement. SALT4 can also be used to verify fully numerical codes. This is similar to the use of analytic solutions for code verification. Although SALT4 was designed for analysis of bedded salt, it is also applicable to crystalline rock if the creep calculation is suppressed. In Section 1.5 of this document the code custodianship and control is described along with the status of verification, validation and peer review of this report.

31286 **(ONWI—434) GEOTHER: a two-phase fluid-flow and heat-transport code.** (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 166p. NTIS, PC A08/MF A01. Order Number DE83011504.

GEOTHER is a three-dimensional geothermal reservoir simulation code. The model describes heat transport and flow of a single component, two-phase fluid in porous media. It is based on the continuity equations for steam and water, which are reduced to two nonlinear partial differential equations in which the dependent variables are fluid pressure and enthalpy. These equations, describing three-dimensional effects, are approximated using finite-difference techniques and are solved using an iterative technique. The nonlinear coefficients are calculated using Newton-Raphson iteration, and an option is provided for using either upstream or midpoint weighting on the mobility terms. GEOTHER can be used to simulate the fluid-thermal interaction in rock that can be approximated by a porous media representation. It can simulate heat transport and the flow of compressed water, two-phase mixtures, and super-heated steam in porous media over a temperature range of 10 to 300°C. In addition, it can treat the conversion from single- to two-phase flow, and vice versa. It can be used for evaluation of a near repository spatial scale and a time scale of a few years to thousands of years. The model can be used to investigate temperature and fluid pressure changes in response to thermal loading by waste materials. In Section 1.5 of this document the code custodianship and control is described along with the status of verification, validation and peer review of this report.

31287 **(ONWI—447) GSM: Geologic Simulation Model for a hypothetical site in the Columbia Plateau - large computer version. Technical report.** (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 172p. NTIS (US Sales Only), PC E07/MF A01. Order Number DE83011671.

Includes 4 sheets of 24x reduction microfiche.

The Geologic Simulation Model (GSM) is a Monte Carlo simulation program for tracking the future evolution of a repository site over periods up to several million years. Phenomena included in the model that potentially can affect the site over such periods are: climatic changes, glaciation, deformation, geomorphic events, magmatic events, meteorite impact, sea-level fluctuations, shaft seal failure, basement faulting, and undetected features. Interrelationships among phenomena are modeled, and the effects of changes on ground-water flow are followed using a simplified network model of the ground-water system in a two dimensional cross-section of the study area. The model is specific to a potential repository site in the Pasco Basin area of the Columbia Plateau. The Monte Carlo simulation is based on random sampling from a relatively large number of probability density functions supplied by the user. These functions represent phenomena characteristics or probability of occurrence and may be derived by a variety of methods, ranging from statistical analysis to expert opinion. This document has been developed as a model summary and user's guide to the large computer version of GSM. The original version was developd by Battelle Pacific Northwest Laboratory (PNL) and documented in PNL-3542, which provides details of the theoretical basis and the methods for generation of input data. In Section 1.5 of this document the code custodianship and control is described along with the status of verification, validation and peer review of this report.

31288 **(ONWI—452) WAPPA: a Waste Package Performance Assessment code. Technical report.** (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 364p. NTIS (US Sales Only), PC E13/MF A01. Order Number DE83011665.

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The Waste Package Performance Assessment (WAPPA) code is a barrier degradation code for a nuclear waste package in a geologic repository. The model includes five distinct, coupled deg-

radation process models (radiation, thermal, mechanical, corrosion, leaching) which are driven internally by waste decay heat and externally by repository stresses and fluids. The penetration of water into the waste package is tracked radially inwards. The output quantifies the residual state of integrity of the barriers as a function of time and also the heat and radionuclide fluxes to the repository.

31289 **(PNL—4576) Glass leaching performance.** Chick, L.A.; Turcotte, R.P. (Pacific Northwest Lab., Richland, WA (USA)). May 1983. Contract AC06-76RL01830. 59p. NTIS, PC A04/MF A01. Order Number DE83012465.

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Current understanding of the leaching performance of high-level nuclear waste (HLW) glass is summarized. The empirical model of waste glass leaching behavior developed shows that at high water flow rates the glass leach rate is kinetically limited to a maximum value. At intermediate water flow rates, leaching is limited by the solution concentration of silica and decreases with decreasing water flow rates. Release of soluble elements is controlled by silica dissolution because silica forms the binding network of the glass. At low water flow rates, mass loss rates reach values controlled by formation rates of alteration minerals, or by diffusion of dissolution products through essentially stagnant water. The parameters reviewed with respect to their quantifiable influence on leaching behavior include temperature, pH, leachant composition, glass composition, thermal history, and radiation. Of these, temperature is most important since the rate of mass loss approximately doubles with each 10°C increase in dilute solutions. The pH has small effects within the 4 to 10 range. The chemical composition of the leachant is most important with regard to its influence on alteration product formation. Glass composition exhibits the largest effects at high flow rates where improved glasses leach from ten to thirty times slower than glass 76 to 68. The effects of the thermal history (devitrification) of the glass are not likely to be significant. Radiation effects are important primarily in that radiolysis can potentially drive pH values to less than 4. Radiation damage to the glass causes insignificant changes in leaching performance.

31290 **(RHO-BW-SR—82-2-4QP) Basalt Waste Isolation Project: drilling and testing. Quarterly report, October 1, 1982-December 31, 1982.** (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). 1 Jan 1983. Contract AC06-77RL01030. 48p. NTIS, PC A03/MF A01. Order Number DE83010644.

Rockwell Hanford Operations Drilling and Testing Group is responsible for all borehole drilling and testing conducted in support of the Basalt Waste Isolation Project. Geologic and hydrologic characterization data obtained by the group are an internal part of the studies required to assess the feasibility of using the deep basalts beneath the Hanford Site for the terminal disposal of nuclear waste. This document is a summary of drilling and testing results during the fourth calendar quarter (October through December 1982). The principal work during this period included the drilling and/or testing of boreholes RRL-2, RRL-6, RRL-14, DC-4/DC-5, DC-16A, DC-16B, and the McGee Well. Specific highlights of this work are summarized.

31291 **(RHO-BW-ST—27-P) Characterization of reference materials for the Barrier Materials Test Program.** Palmer, R.A.; Aden, G.D.; Johnston, R.G.; Jones, T.E.; Lane, D.L.; Noonan, A.F. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). Jun 1982. Contract AC06-77RL01030. 109p. NTIS, PC A06/MF A01. Order Number DE83011092.

Initial characterization of the geologic and engineered barrier materials for a nuclear waste repository in basalt has been completed. Data have been obtained on the characteristics of the reference waste forms which are being studied for eventual disposal in such a repository. Reference basalt entablature, colonnade, and flow top specimens have been selected from the Umtanum flow, which is the primary basalt flow under consideration for repository siting. Material from the Mabton Interbed Stratum, Pomona Flow basalt, smectite clay from the Pomona Flow, a potassium clinoptilolite, Beverly sandstone and tuff, and Grande Ronde groundwater are also included in the suite of reference geologic materials. Reference engineered barrier materials include sodium bentonite and canister metals such as carbon steel, cupronickel, Hastelloy and Inconel alloys. Spent fuel, borosilicate glass, and supercalcine ceramic comprise the reference waste forms. Analyses were made for physical, chemical, and morphological characteristics using techniques ranging from simple observations of color to sophisticated ultrastructural analysis in the electron microscope. Analyses of the elemental and phase chemistries for most of the reference materials have been completed on typical samples. Determinations of material homogeneity are currently being performed.

31292 **(RHO-HS-SR—82-3-4Q-LIQP) Radioactive liquid wastes discharged to ground in the 200 areas during 1982.** Sliger, G.J. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). 2 Mar 1983. Contract AC06-77RL01030. 229p. NTIS, PC A11/MF A01. Order Number DE83010924.

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This document summarizes radioactive liquids discharged to the ground in the 200 Areas of the Hanford Sites and is provided pursuant to Department of Energy (DOE) Order 5484.1A, Environmental Protection, Safety, and Health Protection Information Reporting Requirements. There are twenty-five liquid effluent discharge streams in the 200 Areas, twenty-one of which are normally contaminated or potentially contaminated with radioactive material. Of these twenty-one streams, two discharged radioactive material above Table I concentration guides, and one other discharged material above Table II concentration guides. The four noncontaminated streams are included to maintain an accurate record of total volume of liquid discharged to each specific waste site. B-Plant process condensate (BCP) exceeded Table I for Sr-90 by a factor of 15 and Cs-137 by a factor of 3.5. Discharge point ws the 216-B-62 Crib. Plans have been developed to provide effluent treatment improvements which will bring this waste stream below Table I concentration guides for all radioisotopes. PUREX process condensate (PDD) exceeded Table II for Cs-137 by a factor of 2.6. Discharge point was the 216-A-10 Crib. UO-3 Plant process condensate (U-12) exceeded Table I for total uranium by a factor of 11. Discharge point was the 216-U-12 Crib. (Note: The uranium limits for liquid have recently been reduced, and the UO-3 Plant has made process changes to meet the new limits in the future.)

31293 **(UCRL—53392) Densification studies of Synroc D for high-level defense waste.** Hoenig, C.; Otto, R.; Campbell, J. (Lawrence Livermore National Lab., CA (USA)). 17 Jan 1983. Contract W-7405-ENG-48. 57p. NTIS, PC A04/MF A01. Order Number DE83011564.

Small- to medium-scale densification experiments were conducted on Synroc D using graphite dies and metal canisters. Pressures at elevated temperatures were applied both isostatically (HIP) and unidirectionally (HUP). Spray-dried/calcined powders formulated for composite or average sludge compositions exhibited initial packing densities of about 25% theoretical. Final densities were in the range of 95 to 99% theoretical, depending on applied pressure and temperature. In final-stage HUP densification, we have found that porosity varies exponentially with time acording to the well-known expression $P + P_0 \exp(-K_0 t)$. The rate constant (K_0) has the Arrhenius form $K_0 = A\sigma \exp(-E/RT)$ which includes a stress or pressure term. Rate constants are calculated from approximately 20 densification experiments conducted under a wide range of conditions; activation energies in the range of 20 to 35 kcal/mole were calculated for the densification process. HIP densification and leaching results are reported for experiments with a wide range of variables: pressure (3 to 30 ksi), temperature (900 to 1200°C), redox calcination method, powder fill density and metal canister material. The results support the conclusion that HUP and HIP densification parameters are very similar and that Synroc-D leaching behavior is essentially independent of density in the range of 90 to 100% theoretical.The densification of Synroc D in a collapsible metal-bellows canister has been simulated by means of modeling calculations. Radial buckling tendencies were also evaluated. Results from large-scale HIP experiments are also reported. Up to 50 kg of Synroc D was densified to greater than 99% theoretical density in a metal-bellows canister 36 cm diameter by 24 cm in height. These data were used as a guide to make recommendations for the full-scale HIP densification of Synroc D using metal-bellows canisters.

31294 (USGS-OFR—82-2) Potential sites suitable for relocation and/or reprocessing of the Grand Junction and Rifle uranium-mill-tailings piles. (Colorado Geological Survey, Denver (USA)). 1982. 188p. Geological Survey Open File Service, Box 25425, Denver Federal Center, Denver, CO 80225.

The procedure and results of a regional search for sites that appear to be suitable for the relocation and/or reprocessing of the Grand Junction and Rifle uranium mill tailings piles are described. This search identified nine potential sites within the study area that are offered to the Candidate Site Review Committee for further consideration. All nine sites can be used for joint disposal of the uranium tailings in both Grand Junction and Rifle. Disposal of any individual pile at any of the nine sites may also be considered by the Committee. It is the responsibility of the Committee to determine which of these sites should be recommended to the US Department of Energy for detailed evaluation of their suitability for uranium tailings disposal. This should include consideration of sites for joint disposal as well as disposal in separate sites. All sites are entirely on federal lands administered by the Bureau of Land Management. The sites fall within five general geographic locations. Two Road, McDonald Creek, and 6 & 50 Reservoir sites lie west of Mack near the Utah-Colorado border. East Salt Creek and Camp Gulch sites are north of Mack near the Mesa-Garfield County Line. Halls Basin and Cheney Reservoir sites are found southeast of Grand Junction west of and below Grand Mesa. Lucas Mesa site lies east of DeBeque across the Colorado River. Flatiron Mesa site is south of Rifle on the northeast flank of Battlement Mesa. A comprehensive site selection process was used to identify the recommended potential sites. None of the sites are completely ideal when all relevant factors are considered. The Committee must compare and weigh the advantages and disadvantages of each site to determine which sites are the most favorable for continued evaluation for long-term containment of the uranium tailings. It must be emphasized that this investigation is of a regional nature and therefore is preliminary.

31295 Method for primary containment of cesium wastes. Angelini, P.; Arnold, W.D.; Blanco, R.E.; Bond, W.D.; Lackey, W.J.; Stinton, D.P. (to Dept. of Energy). US Patent 4,376,792. 15 Mar 1983. Filed date 3 Sep 1981. vp. PAT-APPL-298969.

A method for producing a cesium-retentive waste form, characterized by a high degree of compositional stability and mechanical integrity, is provided by subjecting a cesium-loaded zeolite to heat under conditions suitable for stabilizing the zeolite and immobilizing the cesium, and coating said zeolite for sufficient duration within a suitable environment with at least one dense layer of pyrolytic carbon to seal therein said cesium to produce a final, cesium-bearing waste form. Typically, the zeolite is stabilized and the cesium immobilized in less than four hours by confinement within an air environment maintained at about 600°C. Coatings are thereafter applied by confining the calcined zeolite within a coating environment comprising inert fluidizing and carbon donor gases maintained at 1,000° C. For a suitable duration.

31296 In-situ vitrification of soil. Bonner, W.F.; Brouns, R.A.; Buelt, J.L. (to Dept. of Energy). US Patent 4,376,598. 15 Mar 1983. Filed date 6 Apr 1981. vp. PAT-APPL-251663.

A method of vitrifying soil at or below a soil surface location. Two or more conductive electrodes are inserted into the soil for heating of the soil mass between them to a temperature above its melting temperature. Materials in the soil, such as buried waste, can thereby be effectively immobilized.

31297 Conditioning of radioactive wastes for storage and disposal. Vienna, Austria; International Atomic Energy Agency (1983). 526p. (CONF-820651—).

From International symposium on the conditioning of radioactive wastes for storage and disposal; Utrecht, Netherlands (21 Jun 1982).

Thirty-five papers were presented in eight sessions covering the following main topics: the technical bases for conditioning, the immobilization processes, packaging methods and materials, evaluation of conditioned wastes, quality assurance and cost/benefit considerations. Individual papers were indexed.

0530 Environmental Aspects

REFER ALSO TO CITATION(S) 32448, 32459, 32464, 32465, 32488, 32595, 32630

31298 (EGG-FM—6202) Scientific data necessary to predict radionuclide migration within or near a mined nuclear repository. Downs, W.F. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 59p. NTIS, PC A04/MF A01. Order Number DE83012102.

The National Waste Terminal Storage Program was created to develop a system to isolate radioactive wastes from the biosphere. It has been determined that the most reasonable means for accomplishing this task is to place the high-level and transuranic wastes in mined geologic repositories. Three geologic environments have been selected for further study and evaluation: (1) domed or bedded salt formations, (2) thick basalt flows fo the Columbia River Plateau and (3) alkali igneous rocks, both tuffs and granites, of the Nevada Test Site. Each of these candidate geologies will present a different physical-chemical environment to the waste package. The physical environments have been estimated based on depth of repository, radionuclide loading, and spacing of canisters. The chemical environments are based on initial host-rock mineralogy, native ground-water geochemistry, and likely alteration assemblages. The latter sections of this report discuss the mechanisms of radionuclide release, transport, and retention on the host rocks or their alteration products.

31299 (ONWI—470) Ecosystem studies, endangered species survey - Gibson Dome and Elk Ridge study areas, Paradox Basin, Utah. (Bechtel Group, Inc., San Francisco, CA (USA)). Apr 1983. Contract AC06-76RL01830. 63p. NTIS, PC A04/MF A01. Order Number DE83011126.

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This report is published as a product of the National Waste Terminal Storage (NWTS) Program. The objective of this program is the development of terminal waste storage facilities in deep stable geologic formations for high-level nuclear wastes, including spent fuel elements from commercial power reactors and transuranic nuclear waste for which the federal government is responsible. This report is part of the location and site characterization phase and contains threatened and endangered species information for the Gibson Dome and Elk Ridge study areas of the Paradox Region. The threatened and endangered species information was obtained through site surveys designed and implemented by area experts. The site surveys were performed during the period late summer 1981 - spring 1982 in the Gibson Dome and Elk Ridge Study Areas. No threatened or endangered species were identified in either Lavender or Davis canyons. Additional studies at the borehole locations in Beef Basin did identify the nearest occurrence of a species proposed for endangered status (Astragalus monumentalis, a monument milkvetch, member of the legume family). The species was identified approximately 160 to 300 m (500 to 1000 ft) from a hydro testing drill site. Consequently, construction and operation activity should not cause any adverse impacts. This report will be used to satisfy Section 7 requirements of the Endangered Species Act (PL 93-205 as amended) and to allow the United States Fish and Wildlife Service to verify that no protected species are subject to disturbance as the result of project activities occurring in the Gibson Dome and Elk Ridge study areas.

31300 (USDA-FS—92) Review of uranium spoil and mill tailings revegetation in the western United States. Yamamoto, T. (Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO (USA)). Oct 1982. 27p. Rocky Mountain Forest and Range Experiment Station, 240 West Prospect Street, Fort Collins, CO 80526.

The following aspects of uranium mine and mill tailings management are reviewed and discussed: (1) the history of the uranium remedial action program, (2) magnitude of the uranium spoils problem, (3) uranium deposits, mining, and milling, (4) status of reclamation, (5) problems in revegetation of uranium spoils and tailings, and (6) health and safety considerations.

0540 Health And Safety

REFER ALSO TO CITATION(S) 31263, 31300, 31749, 32386, 32558, 32563, 32564, 32565, 32566, 32591, 32592

31301 **(DOE/UMT—0213) 1981 radon barrier field test at Grand Junction uranium mill tailings pile.** Hartley, J.N.; Gee, G.W.; Baker, E.G.; Freeman, H.D. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 148p. (PNL—4539). NTIS, PC A07/MF A01. Order Number DE83011464.

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Technologies to reduce radon released from uranium mill tailings are being investigated by Pacific Northwest Laboratory as part of the Department of Energy's Uranium Mill Tailings Remedial Action Project (UMTRAP) Technology development program. These technologies include: (1) earthen cover systems, (2) multilayer cover systems, and (3) asphalt emulsion radon barrier systems. During the summer of 1981, a field test was initiated at the Grand Junction, Colorado, uranium tailings pile to evaluate and compare the effectiveness of each radon barrier system. Test plots cover about 1.2 ha (3 acres). The field test has demonstrated the effectiveness of all three cover systems in reducing radon release to near background levels (<20 pCi $m^{-2}s^{-1}$). In conjunction with the field tests, column tests (1.8 m diameter) were initiated with cover systems similar to those in the larger field test plots. The column tests allow a direct comparison of the two test procedures and also provide detailed information on radon transport.

31302 **(IAEA-TECDOC—262) Emergency response planning for transport accidents involving radioactive materials.** (International Atomic Energy Agency, Vienna (Austria)). Mar 1982. 58p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83700829.

The document presents a basic discussion of the various aspects and philosophies of emergency planning and preparedness along with a consideration of the problems which might be encountered in a transportation accident involving a release of radioactive materials. Readers who are responsible for preparing emergency plans and procedures will have to decide on how best to apply this guidance to their own organizational structures and will also have to decide on an emergency planning and preparedness philosophy suitable to their own situations.

31303 (INIS-mf—7499, pp vp) **Radiation protection in logging work using ionizing radiation sources.** Nikodemova, D.; Sladkova, M.; Kudrna, R.; Kubu, M. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)). 1980. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

31304 (KFK—3290, pp 228-249) **Fuel element monitor - a device for criticality control of the dissolver of a reprocessing plant.** Eyrich, W.; Schulze, G.; Wuerz, H.; Becker, H.J. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

The fuel element monitor presented here is based on active and passive neutron measurement. Measurements are made in water with and without the Cf-252 neutron source. The combination of the two methods of measurement makes it possible to determine the increase of the intensity at the detector site by means of induced fission. A description is given of the mechanical structure of the device and of the principle of measurement. The test results - measurements in spent PWR fuel elements of German reactors including a MOX fuel element - are discussed. A prototype device for determining the criticality has been developed for routine operation in the discharging basin of the Karlsruhe reprocessing plant.

31305 **(NUREG/CR—2082) Monitoring for compliance with decommissioning termination survey criteria.** Holoway, C.F.; Witherspoon, J.P.; Dickson, H.W.; Lantz, P.M.; Wright, T. (Oak Ridge National Lab., TN (USA)). Jun 1981. Contract W-7405-ENG-26. 268p. (ORNL/HASRD—95). NTIS, PC A12/MF A01 - GPO $7.00. Order Number DE83010960.

This document was prepared as part of the requirement for considering changes in regulations on decommissioning of commercial nuclear facilities. Specifically, it addresses the final steps needed to ensure that a site which has been decontaminated can be released for unrestricted use. Consideration is given to preliminary and termination (certification surveys designs and procedures which might be used for licensed nuclear fuel-cycle and non-fuel-cycle facilities. In addition, information on instrumentation, evaluation and interpretation of monitoring data, and cost-effectiveness of monitoring is given. This guide was designed to be a general-purpose document both for licensees and regulatory agency inspectors who are concerned with specifications of a monitoring program, complete with checks and audits, which can be used to verify compliance with decommissioning criteria. Moreover, much of the information and methodology presented here furnishes part of the data base being established by the US Nuclear Regulatory Commission in its reappraisal of regulations for decommissioning of licensed facilities.

31306 **(NUREG/CR—2391) DNET self-teaching curriculum.** Cranwell, R.M.; Campbell, J.E.; Stuckwisch, S.E.; Longsine, D.E.; Finley, N.C. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 130p. (SAND—81-2256). NTIS, PC A07/MF A01 - GPO $6.50. Order Number DE83010380.

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This document contains a series of lecture notes, sample problems and solutions for the DNET (Dynamic Network) model which was developed at Sandia National Laboratories for the Risk Methodology for Geologic Disposal of Radioactive Waste Program. The purpose of these notes and problems is to familiarize the student with the code, its capabilities and its limitations. When the student has completed this curriculum, he or she should be able to prepare data input for DNET and have some insights into interpretation of the model output. This report is one of a series of self-teaching curricula prepared under a technology transfer contract for the US Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Division of Waste Management.

31307 **(PB—83-154617) Colorado surface gamma-ray scanner survey. Final report.** Allen, J.W. (Bendix Field Engineering Corp., Grand Junction, CO (USA)). Mar 1982. 151p. (BFEC—1982-3). NTIS, PC A08.

The U.S. Environmental Protection Agency (EPA) conducted a radiation survey of public and private buildings in the vicinity of mineral mining areas to establish the use, if any, of radioactive mineral waste materials in any phase of construction. The survey was conducted in two phases. The initial phase utilized a mobile van equipped with radiation detection instrumentation to survey radioactive levels in the vicinity of the structures of interest. Areas or structures which indicated higher than normal background levels of radiation were recorded for further investigation. The mobile survey van remained on public roads and thoroughfares during these surveys, except when a survey was specifically requested by an owner of remote private property. The radiation detection equipment was typically capable of detecting an anomaly as far away as approximately 150 feet. While the mobile survey system would detect an area of increased radioactivity, it could not identify the source of the radioactivity. The radiation source could have been a pile of radioactive rocks in a yard, a stone facing on a house, or a house foundation consisting of radioactive materials.

0550 Regulations

REFER ALSO TO CITATION(S) 31260, 31271, 31305, 31804

31308 **(CONF-820713—31) Two-stage decision approach to material accounting.** Opelka, J.H.; Sutton, W.B. (Argonne National Lab., IL (USA); Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Physics). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83009942.

From Institute of Nuclear Materials meeting; Washington, DC, USA (19 Jul 1982).

The validity of the alarm threshold 4σ has been checked for hypothetical large and small facilities using a two-stage decision model in which the diverter's strategic variable is the quantity diverted, and the defender's strategic variables are the alarm threshold and the effectiveness of the physical security and material control systems in the possible presence of a diverter. For large facilities, the material accounting system inherently appears not to be a particularly useful system for the deterrence of diversions, and essentially no improvement can be made by lowering the alarm threshold below 4σ. For small facilities, reduction of the threshold to 2σ or 3σ is a cost effective change for the accounting system, but is probably less cost effective than making improvements in the material control and physical security systems.

31309 **(KFK—3365) Analysis of decision procedures for a sequence of inventory periods.** Avenhaus, R. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Spaltstoffflussкontrolle). Jul 1982. 105p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750023.

Optimal test procedures for a sequence of inventory periods will be discussed. Starting with a game theoretical description of the conflict situation between the plant operator and the inspector, the objectives of the inspector as well as the general decision theoretical problem will be formulated. In the first part the objective of 'secure' detection will be emphasized which means that only at the end of the reference time a decision is taken by the inspector. In the second part the objective of 'timely' detection will be emphasized which will lead to sequential test procedures. At the end of the paper all procedures will be summarized, and in view of the multitude of procedures available at the moment some comments about future work will be given.

31310 **(LA-UR—83-1124) Quantitative radiation monitors for containment and surveillance.** Fehlau, P.E. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 7p. (CONF-830423—6). NTIS, PC A02/MF A01. Order Number DE83011174.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

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Quantitative radiation monitors make it possible to differentiate between shielded and unshielded nuclear materials. The hardness of the gamma-ray spectrum is the attribute that characterizes bare or shielded material. Separate high- and low-energy gamma-ray regions are obtained from a single-channel analyzer through its window and discriminator outputs. The monitor counts both outputs and computes a ratio of the high- and low-energy region counts whenever an alarm occurs. The ratio clearly differentiates between shielded and unshielded nuclear material so that the net alarm count may be identified with a small quantity of unshielded material or a large quantity of shielded material. Knowledge of the diverted quantity helps determine whether an inventory should be called to identify the loss.

31311 **(LA-UR—83-1125) Standardization of portable assay instrumentation: the neutron-coincidence tree.** Menlove, H.O. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 16p. (CONF-830423—4). NTIS, PC A02/MF A01. Order Number DE83011159.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

Portions are illegible in microfiche products.

Standardization of portable neutron assay instrumentation has been achieved by using the neutron coincidence technique as a common basis for a wide range of instruments and applications. The electronics originally developed for the High-Level Neutron Coincidence Counter has been adapted to both passive- and active-assay instrumentation for field verification of bulk plutonium, inventory samples, pellets, powders, nitrates, high-enriched uranium, and materials-testing-reactor, light-water-reactor, and mixed-oxide fuel assemblies. The family of detectors developed at Los Alamos National Laboratory and their performance under in-field conditions are described. 16 figures, 3 tables.

31312 **(LA-UR—83-1141) Gamma-ray spectrometer system with high efficiency and high resolution.** Moss, C.E.; Bernard, W.; Dowdy, E.J.; Garcia, C.; Lucas, M.C.; Pratt, J.C. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 4p. (CONF-830423—7). NTIS, PC A02/MF A01. Order Number DE83011136.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

Our gamma-ray spectrometer system, designed for field use, offers high efficiency and high resolution for safeguards applications. The system consists of three 40% high-purity germanium detectors and a LeCroy 3500 data acquisition system that calculates a composite spectrum for the three detectors. The LeCroy 3500 mainframe can be operated remotely from the detector array with control exercised through modems and the telephone system. System performance with a mixed source of ^{125}Sb, ^{154}Eu, and ^{155}Eu confirms the expected efficiency of 120% with the overall resolution showing little degradation over that of the worst detector.

31313 **(LA-UR—83-1142) Measurement system for nuclear safeguards based on bismuth-germanate scintillators.** Moss, C.E.; Dowdy, E.J.; Evans, A.E.; Hamm, M.E.; Lucas, M.C.; Shunk, E.R. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 4p. (CONF-830423—5). NTIS, PC A02/MF A01. Order Number DE83011137.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

To determine gamma-ray flux spectra, with high efficiency as the foremost objective, we constructed a system that uses bismuth-germanage scintillators as sensors. The system, consisting of eight scintillators and a LeCroy 3500 data acquisition system, has been calibrated and characterized from 0.06 to 8.29 MeV. By fitting the calibration spectra with a function containing 17 parameters, we were able to construct theoretical response functions, which we then used to obtain the gamma-ray flux spectra at multiple space points resulting from a variety of radioactive objects of interest in nuclear safeguards. The results of our procedure agree with calculated values to within less than 10%. 6 figures.

31314 **(LA-UR—83-1156) Optimizing the design of international safeguards inspection systems.** Markin, J.T.; Coulter, C.A.; Gutmacher, R.G.; Whitty, W.J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 6p. (CONF-830423—8). NTIS, PC A02/MF A01. Order Number DE83011142.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

Efficient implementation of international inspections for verifying the operation of a nuclear facility requires that available resources be allocated among inspection activities to maximize detection of misoperation. This report describes a design and evaluation method for selecting an inspection system that is optimal for accomplishing inspection objectives. The discussion includes methods for identifying system objectives, defining performance measures, and choosing between candidate systems. Optimization theory is applied in selecting the most preferred inspection design for a single nuclear facility, and an extension to optimal allocation of inspection resources among States containing multiple facilities is outlined. 3 figures, 5 tables.

31315 **(NUREG/CR—3191) Target assignment for security officers to K targets (TASK).** Rowland, J.R.; Shelton, K.W.; Stunkel, C.B. (Oklahoma State Univ., Stillwater (USA). School of Electrical and Computer Engineering). Feb 1983. Contract AC04-76DP00789. 57p. (SAND—83-7012). NTIS, PC A04/MF A01. Order Number DE83011549.

A probabilistic algorithm is developed to provide an optimal Target Assignment for Security officers to K targets (TASK) using a maximin criterion. Under the assumption of only a limited number (N) of security officers, the TASK computer model determines deployment assignments which maximize the system protection against sabotage by an adversary who may select any link in the system, including the weakest, for the point of attack. Applying the TASK model to a hypothetical nuclear facility containing a nine-level building reveals that aggregate targets covering multiple vital areas should be utilized to reduce the number of possible target assignments to a value equal to or only slightly larger than N. The increased probability that a given aggregate target is covered by one or more security officers offsets the slight decrease in interruption probability due to its occurring earlier in the adversary's path. In brief, the TASK model determines the optimal maximin deployment strategy for limited numbers of security officers and calculates a quantitative measure of the resulting system protection.

31316 **(OTA-E—148) Nuclear proliferation and safeguards. Summary.** (Office of Technology Assessment (U.S. Congress), Washington, DC). Mar 1982. 47p. Office of Technology Assessment, Washington, DC 20510.

This comprehensive analysis of the technological, economic, and political factors affecting the potential spread of nuclear weapons proved useful in the congressional debate which culminated in the Nuclear Non-Proliferation Act of 1978. The report was subsequently published commercially and has been a frequently cited reference in the literature on proliferation and nuclear power. Despite developments since 1977, the information in the OTA report is still useful to those wishing to obtain an indepth understanding of the issues. Included is an analysis of why a nation might want nuclear weapons development program and the various sources of nuclear material are discussed. The control of proliferation is considered as well as its relation to the nuclear industry.

31317 **(SAND—83-0826C) Advances in containment and surveillance (C/S) which enhance the interaction between safeguards authorities and the operators.** Waddoups, I.G. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 7p. (CONF-830423—3). NTIS, PC A02/MF A01. Order Number DE83008897.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

Recent developments in containment and surveillance equipment and techniques offer improved interactions between safeguards authorities and facility operators. This has been accomplished by providing (1) timely information for use during, rather than after an inspection visit; (2) data simultaneously to both the operator and the inspectorate; and (3) automated means of collecting data which frees both operator and inspector personnel for other duties. Illustrative examples are given for each of these areas.

31318 **Nuclear safeguards technology 1982. Volume 1.** Vienna, Austria; International Atomic Energy Agency (1983). 569p. (CONF-821119—).

From International symposium on recent advances in nuclear materials safeguards; Vienna, Austria (8 Nov 1982).

Seven sessions covered the following topics: assessment of existing safeguards; approaches to safeguards; state and facility material control systems; destructive analytical measurements; containment and surveillance in IAEA safeguards; isotope correlation techniques; and near-real-time material accountancy. Individual papers were indexed.

31319 **Nuclear safeguards technology, 1982. Volume II.** Vienna, Austria; International Atomic Energy Agency (1983). 601p. (CONF-821119—).

From International symposium on recent advances in nuclear materials safeguards; Vienna, Austria (8 Nov 1982).

Four sessions covered the following main topics: non-destructive measurements; statistics in IAEA Safeguards; safeguards for reprocessing facilities; and safeguards for enrichment facilities. Individual papers were indexed.

06 FUSION FUELS

0602 Processing

31320 **(UCRL—84006) Inertial-confinement-fusion targets.** Hendricks, C.D. (Lawrence Livermore National Lab., CA (USA)). 10 Aug 1982. Contract W-7405-ENG-48. 24p. (CONF-800208—28). NTIS, PC A02/MF A01. Order Number DE83010614.

From Topical meeting on inertial confinement fusion; San Diego, CA, USA (26 Feb 1980).

Much of the research in laser fusion has been done using simple ball on-stalk targets filled with a deuterium-tritium mixture. The targets operated in the exploding pusher mode in which the laser energy was delivered in a very short time (~ 100 ps or less) and was absorbed by the glass wall of the target. The high energy density in the glass literally exploded the shell with the inward moving glass compressing the DT fuel to high temperatures and moderate densities. Temperatures achieved were high enough to produce DT reactions and accompanying thermonuclear neutrons and alpha particles. The primary criteria imposed on the target builders were: (1) wall thickness, (2) sphere diameter, and (3) fuel in the sphere.

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY

0701 Physical Isotope Separation

31321 **(CONF-8208101—4) Preparation of ^{75}Br by the ^{78}Kr(p,α) ^{75}Br reaction.** Friedman, A.M.; DeJesus, O.J.; Harper, P.; Armstrong, C. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83010563.

From 4. international symposium on radiopharmaceutical chemistry; Juelich, F.R. Germany (23 Aug 1982).

^{75}Br is a potentially useful isotope for positron emission tomography but its preparation in high purity has required the use of a relatively large cyclotron. It has been found that quantities of the order of 30 to 40 millcuries can be prepared by the ^{78}Kr(p,α) reaction at energies between 12 and 15 MeV and the product contains less than 0.1% of ^{76}Br contamination.

31322 **(UCID—19760) Kinetics of tritium removal from heavy water by exchange with deuterochloroform.** Hsiao, P. (Lawrence Livermore National Lab., CA (USA)). 14 Mar 1983. Contract W-7405-ENG-48. 19p. NTIS, PC A02/MF A01. Order Number DE83012042.

A technique was developed to determine the rate and equilibrium constants for the base-catalyzed exchange of tritium from ehavy water to deuterochloroform. An activation energy and entropy were also calculated. These quantities are comparable with those reported in the literature for a similar reaction involving the exchange of deuterium from deuterochloroform to water. It was found that the exchange reaction occurred predominately between the dissolved reactants in the D_2O and $CDCl_3$ phases. The rate constant is a strong direct function of temperature while the equilibrium constant is a weak inverse function.

31323 **Radioisotopes distributed for industrial applications by Oak Ridge National Laboratory.** Lamb, E. (Oak Ridge National Lab., TN (USA)). pp 474 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/76P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31324 **Material marking with short half-life radionuclides generated in situ.** Akerman, K. (Isotopenforschung Dr. Sauerwein GmbH, Haan/Rheinland, Germany, F.R.). pp 460 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/36P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

0702 Radiation Sources

REFER ALSO TO CITATION(S) 32244, 32280, 32377, 32762

31325 (INIS-mf—7498, pp vp) **Table top beta ray irradiator for thin biological samples.** Kushelevsky, A.; Manori, I. (Ben-Gurion Univ. of the Negev, Beersheba (Israel). Dept. of Nuclear Engineering); Dahan, S.D.; Pasi, M. (Israel Atomic Energy Commission, Beersheba. Nuclear Research Center-Negev). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31326 (INIS-mf—7498, pp vp) **Computer program for calculating dimensions of shielding containers for industrial radiation sources.** Pasi, M.; Even-Zohar, Y.; Caras, I. (Israel Atomic Energy Commission, Beersheba. Nuclear Research Center-Negev). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31327 (INIS-mf—7499, pp vp) **Some radiation hygiene aspects of uses of ^{99}Mo-sup(99m)Tc generator.** Vlcek, J. (Krajska Hygienicka Stanice, Hradec Kralove (Czechoslovakia)); Husak, V.; Rohacek, J. (Fakultni Nemocnice, Olomouc (Czechoslovakia). Oddeleni Nuklearni Mediciny). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

31328 (INIS-mf—7499, pp vp) **Mean beta energy above mix of two radionuclides.** Hert, M.; Pospisil, J. (Vojensky Ustav Hygieny, Epidemiologie a Mikrobiologie, Prague (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

31329 **(INS-R—274) Calibration of a sewage flow rate measuring flume.** Barry, B.J.; Marment, K.B. (Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences). Aug 1980. 10p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700353.

Flow measurements by the dilution method using radioactive tracers were made in a sewer to calibrate a flume at which, in an automatic process, water level readings are used to calculate flow. Despite some problems with both methods, the results imply that the flume calibration is satisfactory.

31330 **(PB—83-146845) Semiconductor measurement technology: graphical solution for the helium leak detector and radioisotope methods of hermetic test - master graphs and instructions. Final report.** Ruthberg, S. (National Bureau of Standards, Washington, DC (USA)). Nov 1982. 40p. NTIS, PC A03/MF A01.

A graphical procedure for solution of the molecular flow approximation for the back pressurization method of hermetic test makes use of a set of characteristic curves and a test line. The characteristic curves are appropriate for both the helium leak detector and the radioisotope methods of test, although the form of the test line differs between the two methods. Master graphs of the characteristic curves and test lines are now provided in a scale and format appropriate for producing suitable worksheets with a copier. Step-by-step instructions are given for their use in obtaining solutions for various examples relative to the test specifications in acceptance standards such as MIL-STD 883B, etc. One set of characteristics is provided specifically for the helium leak detector mode as expressed directly in terms of air leak rate; a second set is provided specifically for the krypton-85 radioisotope mode also in terms of air leak rate; and a third set is retained in the original form for use with any tracer gas.

31331 **Developments in thin-layer activation for measurements of wear, erosion and corrosion.** Conlon, T.W.; Asher, J. (UKAEA Atomic Energy Research Establishment, Harwell. Nuclear Physics Div.). pp 472 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/72P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31332 **Examples of radioisotope and radiation applications in Brazilian industry.** Castagnet, A.C.; Szulak, C.; Banados Perez, H.E. (Instituto de Pesquisas Energeticas e Nucleares, Sao Paulo (Brazil)). pp 535 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/4P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31333 **Present status of radioisotopes and radiation applications in India.** Iya, V.K.; Deshpande, R.G.; Murthy, T.S.; Krishnamurthy, K. (Bhabha Atomic Research Centre, Bombay (India)). pp 539 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/45P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31334 **Summary of the conference.** Cornuet, R. (CEA Centre d'Etudes Nucleaires de Grenoble, 38 (France)). pp 559-565 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Principal trends observed in the various sessions are summarized. Apart from the use of γ-rays or X-rays in the exploration, processing and recycling of resources, the preferred technique is that involving neutrons, which are used either in scattering and delay measurements or for their ability to activate elements in situ. Industrial radiation processing will probably develop towards improvement in product quality and towards energy saving, rather than towards new compounds or revolutionary techniques. Radiation sterilization of medical products will in all probability continue to develop and will certainly maintain its leading position where the use of intense radiation is concerned. In the field of environmental conservation development of tracer techniques for detection and research is expected in the future. Because of the economic problems, it is unlikely that anything significant will be achieved in the short term in the treatment of polluted gases or water. In con-

trast to industrial radiation processing, bioengineering represents a quite exceptional field for radiation technology. The main areas of interest will probably be artificial limbs using more resistant materials with a better biocompatibility and various types of appliance for placing active products in a "reservoir". Industrial process and quality control is the most extensive field for the application of radioisotopes and it covers the use of both tracers and radioisotope equipment. The techniques which are now in use have become standard and it is at the performance level that improvements are to be expected.

31335 **Future prospects of industrial radiation processing.** Charlesby, A. (Royal Military Coll. of Science, Shrivenham (UK)). pp 105-115 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/120; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

From some basic scientific discoveries more than three decades ago, radiation processing has grown rapidly in two major fields; other potential fields have been less successful. The situation is now changing rapidly as industrialists, possibly impressed by the success in these two fields and the greatly improved availability of powerful radiation sources, are developing new areas of radiation technology. Some of these are outlined in the paper, and extend from solid-state reactions to food technology, biomaterial and environmental improvements. The major needs at present are closer collaboration between industrial technologists who can best appreciate the potential requirements and applications, and radiation scientists who know the possibilities where radiation can meet these needs. Suggestions to improve this collaboration are given.

31336 **1.4-m electron curing system for rigid sheet products.** Nablo, S.V.; Quintal, B.S. (Energy Sciences Inc., Woburn, MA (USA)); French, D. (Universal Woods, Inc., Louisville, KY, USA). pp 133 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/80P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31337 **Radiation treatment of waste water.** Takehisa, M.; Sakumoto, A. (Japan Atomic Energy Research Inst., Takasaki, Gunma. Takasaki Radiation Chemistry Research Establishment). pp 217-233 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/105; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Indiscriminate decomposition of organics in oxygenated waste water to carbon dioxide and water can be attained by strong active species produced by water radiolysis. The G-values of decomposition, COD reduction, and TOC reduction range from 1 to 3. The radiation treatment of thousands of tons of waste water now can be done daily by use of a high-power electron accelerator. While reduction of radiation energy for waste-water treatment is still the key to the technology, the combination of radiation treatment with a conventional water-treatment process, such as activated sludge treatment, co-precipitation, and ozonation, is effective for the purpose and is able to remove non-degradable organics by a conventional process alone. The present paper describes the achievement in JAERI along these lines and indicates that economics and technology are no longer a prohibiting factor of radiation processing, but a balancing factor to the advantage of new processing.

31338 **Protection of the cultural environment by nuclear techniques.** Ramiere, R. (CEA Centre d'Etudes Nucleaires de Grenoble, 38 (France)). pp 255-270 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/113; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

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The use of gamma radiation in the preservation of the cultural environment, and in particular art objects, is examined. In each branch, the present status of research on, and its application to, the treatment of art objects is described. Two major applications - disinfection and consolidation - are reviewed: (1) Disinfection: The destruction by gamma irradiation of xylophagous insects and of fungi which contaminate paintings, pictorial documents and mummies, is discussed. The effect of gamma-rays on the constituent materials of the infected objects is examined. (2) Consolidation: this process represents an extrapolation to the preservation of cultural objects of research performed over the last 20 years with the aim of improving the mechanical properties of porous materials (by impregnation of the material in a vacuum by a liquid plastic substance which is polymerized by radiation in situ). This technique is currently being used to treat "uncoated" wooden objects and, to a more limited extent, "coated" wood (polychromy and gilt wood), depending on the fragility of the covering. With regard to stone materials, the enhancement of the mechanical properties of a limestone impregnated with a styrene-polyester resin is described; this resin has been used to treat several sculptures. The use of acrylics and methacrylics has caused some samples to crack during radiation polymerization; theories put forward to explain this phenomenon are discussed. The consolidation of terracotta and bone has also been studied. The consolidation of waterlogged wood (archaeological wood) requires a different impregnation technique (diffusion in liquid). This preservation method has already been used to treat archaeological artifacts.

31339 **Conservation and consolidation of archaeological works by radiation-induced polymerization methods.** Guven, O. (Hacettepe Univ., Department of Chemistry, Ankara, Turkey). pp 275 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/70P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31340 **Applied radiation experiments with a current-wave electron linac.** McKeown, J.; Fraser, J.S.; Hodge, S.B. (Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.). pp 497 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/5P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31341 **Cobalt-60: Outlook for the 1980s.** Fraser, F.M.; McKinnon, R.G.; Ouwerkerk, T. (Atomic Energy of Canada Ltd., Ottawa, Ontario. Commercial Products). pp 503 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/85P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31342 **New multipurpose plant for treatment of foodstuffs.** Carassiti, F. (Rome Univ. (Italy)); Tata, A. (Snia Techint, Tecnologie Energetiche Avanzate S.p.A., Rome, Italy). pp 504 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/91P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31343 **United States radioisotopes beneficial uses programme.** Remini, W.C. (Department of Energy, Washington, DC (USA)). pp 541-542 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/77P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31344 **Determination by radioactive isotopes of the dependence of briquette quality on lignite from different mines and layers.** Leonhardt, J.W.; Koennecke, H.G.; Otto, R.; Hecht, P.; Ulrich, H. (Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung). pp 95 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/27P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31345 **Radiation chemical mechanisms in the irradiation treatments of sewage sludge.** Groneman, A.F. (Association Euratom-ITAL, Wageningen (Netherlands)). pp 98 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/55P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31346 **Use of radioisotope techniques on off-shore oil platforms.** Evans, G.V.; Parsons, T.V. (UKAEA Atomic Energy Research Establishment, Harwell). pp 99-100 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/73P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31347 **Radioisotope techniques for the investigation of process problems in the chemical industry.** Charlton, J.S.; Heslop, J.A.; Johnson, P. (Imperial Chemical Industries Ltd., Billingham (UK)). pp 393-418 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/110; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

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This paper reviews the ways in which radioisotope techniques can be used to solve process plant problems. In recognizing that the field of application is very large, attention has been concentrated on those techniques which have been found to be of greatest use. This selection is made on the basis of the work spectrum of a practising radioisotope applications unit which, each year, completes more than fifteen hundred applications. The techniques considered fall into three categories: sealed-source application, tracer methods and activable tracer techniques. Applications from each category are described and, where appropriate, indications of the resulting economic benefits are given.

31348 **Radionuclide technology applications in development and production in the automobile industry.** Sailer, S. (Daimler-Benz A.G., Stuttgart (Germany, F.R.). Abt. Zentralwerkstofftechnik). pp 433-448 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/112; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Radionuclide technology (RNT) is utilized for air-engineering measurements. The spheres of interest here are the magnitude of the air flow and its spatial distribution in the interior of passenger cars, truck cabs and buses. For this purpose the air inside the vehicle is marked with ^{85}Kr, and the decrease in activity is measured at various driving speeds simulated in a wind tunnel. Oil consumption measurements with tritium-marked motor oil are used primarily to optimize new engines in terms of design (e.g. piston-ring components, type of lubrication), materials and lubricants. For this purpose the oil consumption is measured under various engine operating conditions (oil-consumption performance graph). The oil consumption of the individual cylinders can also be measured. The effect of production technologies (e.g. form and surface perfection) on oil consumption is important for improving production. The radionuclide technique most often used in the automobile industry is for the measurement of wear. The focal point here is the optimization of tribological systems in the development of engines, transmissions etc., studying the influence of design, materials and lubricants and determining the operating conditions which are critical for wear. Important information regarding the influence of production technologies on wear can be gained for production. In addition, considerable savings and higher quality can be realized in production by optimization of engine run-in programmes with RNT. The common factors for all RNT processes mentioned are that, compared with conventional measuring procedures, they are more precise, require shorter testing times, and can be performed under normal operating conditions. The prerequisites are careful selection of the applications and continual optimization of measurement technology.

31349 **Precise determination of gas flow-rate using radioisotopes.** Airey, P.L.; Hanna, G.L.; Clouston, J.G. (Australian Atomic Energy Commission, Sutherland, NSW). pp 451 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/1P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31350 **Chemical process analysis with nuclear techniques.** Thyn, J. (Institute for Research, Production and Applications of Radionuclides, Prague, Czechoslovakia). pp 454-455 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/9P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31351 **Residence time distribution (RTD) of gas penetrating a granular spouted bed or a liquid layer.** Zitny, R. (Karlova Univ., Prague (Czechoslovakia)); Thyn, J. (Institute for Research, Production and Applications of Radionuclides, Prague, Czechoslovakia). pp 455 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/11P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31352 **Measurement of mixing efficiency of continuous mixers.** Lehtola, S.; Kuoppamaeki, R. (Valtion Teknillinen Tutkimuskeskus, Espoo (Finland)). pp 456 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/15P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

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31353 **Application of radiotracers for the determination of mixing quality in technological homogenization processes.** Merz, A.; Graczyk, J. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Lab. fuer Isotopentechnik). pp 458 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/30P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31354 **Investigations and process control in metallurgy using radioactive isotopes.** Lehofer, K.; Rozsa, S.; Hirling, J. (Magyar Tudomanyos Akademia, Budapest. Izotopintezete). pp 462 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/41P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

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31355 **Radioisotope investigation of sediment yield in a sewage treatment plant.** Ponikiewska, H.M. (Instytut Meteorologii i Gospodarki Wodnej, Krakow (Poland)). pp 464-465 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/57P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31356 **Application of radioisotopes in investigations of the hydrometallurgy of non-ferrous metals.** Urbanski, T.S.; Lada, W.; Malec-Czechowska, K.; Migdal, W. (Institute of Nuclear Research, Warsaw (Poland)). pp 465-466 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/58P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31357 **Predicting removal efficiency in rectangular sedimentation tanks by the radiotracer method.** Szpilowski, S.; Owczarczyk, A.; Michalik, J. (Institute of Nuclear Research, Warsaw (Poland)). pp 467-468 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/59P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31358 **Multi-point measurement system for process dynamics study using the radiotracer method.** Malik, R.; Bazaniak, Z.; Michalik, J.; Dzieglewski, G. (Institute of Nuclear Research, Warsaw (Poland)). pp 468-469 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/60P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31359 **Investigation by radioactive tracers of the functional aspects of agricultural machines.** Radwan, M.; Milanowski, M. (Politechnika Poznanska (Poland)). pp 469-470 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/64P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31360 **Determination of flow-pattern parameters of the catalyst in fluidized bed.** dos Santos, V.A. Costa Dantas, C. (Pernambuco Univ., Recife (Brazil). Centro de Energia Nuclear). pp 475-476 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/83P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

31361 **Use of radioactive tracers to study sediment transport under the action of waves. Application to the extraction of marine agregates.** Caillot, A.; Gourlez, P.; Hoslin, R.; Massias, J.; Quesney, M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Office des Rayonnements Ionisants). pp 482 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/98P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

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08 HYDROGEN

REFER ALSO TO CITATION(S) 31018

0801 Production

REFER ALSO TO CITATION(S) 31476

31362 **(BNL—51651) Assessment of the OHZ hydrogen process. Final report.** Silverstein, C.C. (CCS Associates, Bethel Park, PA (USA)). Sep 1982. Contract AC02-76CH00016. 86p. NTIS, PC A05/MF A01. Order Number DE83011085.

The oxygen-hydrogen-zeolite (OHZ) process utilizes the strongly ionizing characteristics of cations exchanged into a crystalline zeolite lattice to catalytically decompose water in two distinct steps. These steps take place at two different temperatures in the same bed of zeolite particles. At the higher temperature, initially hydrated zeolite is dehydrated, and oxygen is generated from the remaining residual water. When the zeolite is cooled to a lower temperature and rehydrated, hydrogen remaining in the lattice from the high temperature step is released. The OHZ process is characterized by process simplicity, temperatures below 1400°F, the absence of corrosive chemicals, relative ease of product separation, and environmental acceptability. These characteristics strongly suggest that the OHZ process could require less development and have greater commercial potential than other developmental hydrogen processes. These considerations led to the investigation. The purposes of the investigation were: (1) to survey the current state of knowledge on the OHZ hydrogen process and the cation-exchanged zeolites which are used in the process; (2) to obtain preliminary data on process energy requirements; (3) to assess the commercial potential of the process through preliminary plant design studies; and (4) to identify process design and performance goals for commercial viability.

31363 **(EUR—7661) Non-fossil derived hydrogen in coal conversion processes: A further study.** Merrick, D.; Smith, M.; Rasmussen, G. (Commission of the European Communities, Luxembourg. Directorate-General for Research, Science and Education). 1981. 118p. Available from Commission of the European Communities, Luxembourg.

This report summarises, in addition to an earlier study of the NCB, how nonfossil derived (NFD) hydrogen can be used in coal conversion. On two reference processes technical and economical issues are discussed, namely the Fischer/Tropsch-liquefaction and the production of substitute natural gas (SNG) by gasification/CH_4-synthesis. The source of hydrogen is water electrolysis, whose energy comes directly from nuclear power in one case and from electricity out of nuclear power in the other case. The use of NFD-hydrogen increases the product yield per unit of coal input, furthermore the electrolytically produced oxygen can be used. At 1979 European coal prices of 1.9 to 3.3 $/GJ it is estimated that the NFD-hydrogen application becomes economically competitive at a price between 5 and 6 $/GJ for the SNG-process and 7 and 9 $/GJ for the liquefaction. The use of pure hydrogen in coal conversion must also be seen in competition with its direct use as a fuel.

31364 **(NP—3901143) Experimental study and reaction yield considerations of vanadium/chlorine- and vanadium/bromine-multistep processes for the thermochemical production of hydrogen.** Schuster, P. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen). 28 Nov 1980. 131p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901143.

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In this work pure thermochemical hydrogen production processes have been studied of the vanadium/chlorine - and the vanadium/bromine family. After a scan of the cyclic processes of the vanadium/chlorine-family proposed in the literature, and an evaluation of the available information for the respective chemical reactions, the process presented by Funk and Reinstrom seems to be most promising, if the hydrogen producing reaction is modified as proposed in this work. Motivated by the positive results of a reaction yield study (assuming equilibrium for all chemical reactions), the individual reactions have been studied experimentally on the laboratory scale.

31365 **(UCRL—87498) Performance requirements of an inertial-fusion-energy source for hydrogen production.** Hovingh, J. (Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-48. 13p. (CONF-830406—26). NTIS, PC A02/MF A01. Order Number DE83010984.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

Performance of an inertial fusion system for the production of hydrogen is compared to a tandem-mirror-system hydrogen producer. Both systems use the General Atomic sulfur-iodine hydrogen-production cycle and produce no net electric power to the grid. An ICF-driven hydrogen producer will have higher system gains and lower electrical-consumption ratios than the design point for the tandem-mirror system if the inertial-fusion-energy gain eta Q $>$ 8.8. For the ICF system to have a higher hydrogen production rate per unit fusion power than the tandem-mirror system requires that eta Q $>$ 17. These can be achieved utilizing realistic laser and pellet performances.

0802 Storage

31366 **(CALT—822-139) Structure of glassy early-transition metal - late transition-metal hydrides.** Samwer, K.; Johnson, W.L. (California Inst. of Tech., Pasadena (USA). W.M. Keck Lab. of Engineering Materials). Jan 1983. Contract AT03-81ER10870. 26p. NTIS, PC A03/MF A01. Order Number DE83010931.

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Hydrogen is used as a probe for obtaining structural information on metallic glasses. Results from experimental radial distribution functions of hydrided and unhydrided Zr_3Rh and Zr_3Pd glasses show a significant change in the nearest neighbor distance of Zr atoms. The measured distance suggests that hydrogen occupies mainly tetrahedral sites defined by four Zr atoms under normal hydriding conditions (1 atm. H_2, $\sim$ 200 C). A statistical model for these sites based on current dense random packing models is in good agreement with the observed absorption capacity for hydrogen. It is predicted that H-H interaction should limit the upper value of hydrogen content in Zr-based glasses to 2.5 (H/metal atom). 5 figures, 2 tables.

09 OTHER SYNTHETIC AND NATURAL FUELS

REFER ALSO TO CITATION(S) 31018, 31902

0901 Hydrocarbon Fuels

REFER ALSO TO CITATION(S) 31384, 31983, 31993

31367 **(DOE/PETC/TR—83/6) Data base for fused-iron catalyst in the Fischer-Tropsch reaction.** Batchelder, R.F.; Pennline, H.W.; Schehl, R.R. (USDOE Pittsburgh Energy Technology Center, PA). Apr 1982. 69p. NTIS, PC A04/MF A01. Order Number DE83011163.

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Various tests were conducted with a promoted, fused-iron catalyst. Hydrogen and carbon monoxide mixtures of different ratios with or without light olefin additives were reacted in a gradientless, mixed reactor. Process and catalyst parameters investigated were temperature (250 to 325°C), pressure (100 to 600 psig), H_2:CO synthesis gas ratio (1/1 to 4/1), and catalyst particle size. Results from these experiments have been presented graphically, and observations have been discussed.

31368 **(PB—83-152645) Increased automobile fuel efficiency and synthetic fuels: alternatives for reducing oil imports. Background paper 5. Water availability for synthetic fuels: An assessment of current studies.** (Office of Technology Assessment (U.S. Congress), Washington, DC). Oct 1982. 151p. NTIS, PC A08/MF A01.

The objective of this study is to describe and analyze the hydrologic, institutional, legal, and economic issues involved in assessing and interpreting estimates of water availability for synfuels development in four major river basins: (1) Upper Mississippi, (2) Ohio/Tennessee, (3) Upper Missouri, and (4) Upper Colorado.

31369 **Decentralized integrated systems for biomass production and its energy/nonenergy utilization.** Carioca, J.O.B.; Arora, H.L. (Federal Univ., Ceara, Brazil). pp 161-210 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Oil-importing developing countries (OIDCs) consume relatively small amounts of oil, but over two-thirds of it is imported and taking a negative toll on the economy. They also consume only small amounts of commercial energy in the agricultural sector, but that amount is essential to feed their growing populations. The uneven world distribution of energy must be taken into account when assessing the petroleum crisis and the potential for biomass for energy and nonenergy products in OIDCs. Biomass production introduces land-use as well as technical and economic considerations. A set of criteria for evaluating biomass options recommends a comprehensive study of, among others, the socio-economic and environmental factors, a re-evaluation of planning and decision-making criteria, and international support of rural cooperatives, family planning, and sanitation. 26 references, 5 figures, 5 tables. (DCK)

0902 Alcohol Fuels

REFER ALSO TO CITATION(S) 31074, 31369, 31380, 31983

31370 **(DOE/PC/30019—T6) Liquid-phase methanol process-development unit: installation, operation, and support studies. Technical progress report No. 6, 1 January 1983-31 March 1983.** (Air Products and Chemicals, Inc., Allentown, PA (USA); Chem Systems, Inc., Tarrytown, NY (USA)). 20 Apr 1983. Contract AC22-81PC30019. 130p. NTIS, PC A07/MF A01. Order Number DE83010603.

Experiments confirmed the need for iron carbonyl removal equipment, and bids on these items were evaluated. Equipment procurement for the LaPorte PDU has been completed, with the exception of iron carbonyl removal equipment. On 13 January, several technical redirections were proposed to DOE. In reactor modeling, APCI completed a study of the significance of mass transfer and equilibrium constraints on CSI advance funded data. The results suggest that this data is difficult to use for evaluating kinetics. The backflow reactor model was modified. At CSI, all equipment for the analytical portion of the DEC/AIM data acquisition system for LaPorte has been received. In the CSI autoclave, optimization of catalyst reduction procedures continued. Four liquid-entrained commercial catalysts were evaluated. An attrition test unit was constructed and testing of liquid-fluidized catalyst attrition has begun under methanol synthesis conditions. Modifications of the CSI Lab PDU are about 95% complete. APCI signed a contract with Hydrocarbon Research, Inc. (HRI) for cold-flow studies of the ebullated bed reactor design.

31371 **(PNL-SA—10995) Catalytic-steam gasification of wood for the production of methanol synthesis gas.** Baker, E.G.; Mitchell, D.H.; Mudge, L.K.; Brown, M.D. (Pacific Northwest Lab., Richland, WA (USA)). Dec 1982. Contract AC06-76RL01830. 11p. (CONF-830308—11). NTIS, PC A02/MF A01. Order Number DE83010353.

From American Insititute of Chemical Engineers national meeting; Houston, TX, USA (27 Mar 1983).

In the process being developed by PNL, wood chips are reacted with steam in the presence of catalysts. The shift conversion and reforming reactions take place in the gasifier promoted by the catalyst. After CO_2 removal the product gas contains about 95% synthesis gas (H_2 + CO) in approximately 2:1 H_2/CO ratio. Both laboratory and process development unit (PDU) scale studies are being developed. Laboratory studies were successful in developing operating conditions and catalyst systems for the production of methanol synthesis gas. The $NiCoMo/SiO_2$-Al_2O_3 catalyst is one of a series of trimetallic catalysts tested. This catalyst reached a lifetime of 1470 g of wood/g catalyst without loss of activity in a laboratory test run. The run was terminated with the catalyst still active. Also studied was the use of alkali carbonates as catalysts for the steam-char reaction. The following conclusions are based on current results from catalyzed steam gasification of wood: steam gasification of wood in the presence of catalysts to produce a methanol synthesis gas is technically feasible; long catalyst lifetimes have been demonstrated in laboratory tests but need to be confirmed in a larger scale gasifier; fluidized bed gasification of wood at 10 atm presents no significant problems; and cost of methanol from large facilities is competitive with the current price of methanol.

0904 Solid Waste And Wood Fuels

REFER ALSO TO CITATION(S) 31379

13 HYDRO ENERGY

1303 Plant Design And Operation

31372 **(DOE/ID/12208—T1) Optimization of a diffuser/ejector for ultra low-head hydroelectric systems. Final report.** Moses, H.L.; Haynes, W.E.; Myatt, R.L.; Siegel, R.P. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Mechanical Engineering). Mar 1983. Contract FC07-80ID12208. 203p. NTIS, PC A10/MF A01. Order Number DE83011251.

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An investigation of head augmentation for ultra low-head hydroelectric systems by use of an ejector in the diffuser, or draft tube, is described. A detailed analytical and experimental study of flow in the ejector, which consisted of a conical diffuser with a peripheral wall jet, was conducted. Based on these results, an overall system analysis was developed and compared with experimental results from a small, axial-flow turbine. Finally, a brief economic analysis was made to determine the advantage, if any, of the ejector system. It was determined that an appreciable increase in head could be achieved and predicted by the analysis. Under certain circumstances where excess flow is available, the increase in head would result in a significant decrease in turbine size and cost for a fixed power. However, for a limited flow rate, the increase in head would be offset by a decrease in output power, and there would be no economic advantage.

1306 Environmental Aspects

31373 **(NP—3901275) Concerns of the environment as considered in regional planning.** Hoppe, W.; Witzmann, K.; Wilkes, P.J.; Singer, P.; Steimann, F.; Timmer, R.; Ernst, W.; Erbguth, W.; Schlarmann, H. (Muenster Univ. (Germany, F.R.). Sonderforschungsbereich 26 Raumordnung und Raumwirtschaft). Dec 1980. 89p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83901275.

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Considering all the viewpoints and paying due attention to arguments of energy economy and the protection of nature and landscapes, water economy, town-planning, close-range recreation areas and tourism the project of developing the lower Salzach valley is seen to be unpracticable.

14 SOLAR ENERGY

1403 Economics

31374 **(ANL/EES-TM—215) National implications of high solar and biomass energy growth: executive summary of the Technology Assessment of Solar Energy Project.** D'Alessio, G.J. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 37p. NTIS, PC A03/MF A01. Order Number DE83011659.

The Technology Assessment of Solar Energy (TASE) project is a comprehensive multiyear analysis of the environmental, resource, and community impacts which could result in the year 2000 if major national incentives were adopted to accelerate solar and biomass energy use. The study uses a comparative approach to examine (a) the potential impacts of large numbers of solar and biomass units, and (b) the potential reductions in the impacts of new conventional technologies which would be displaced. In addition,

TASE examines the indirect pollution impacts associated with the manufacturing of solar systems at greater and lesser rates. Overall, massive incentives for solar and biomass energy over the next 20 years can lead to major stresses on national capital and finished materials resources as well as to significant air pollution and safety problems. A range of less costly general approaches lies in greater near-term emphasis on more-mature, competitive technologies and specifically on biomass rather than solar technologies. The findings lead to the conclusions that (a) there are inherent limits to significant, near-term growth in solar energy use in the United States, and (b) certain high biomass energy growth options may be limited by environmental and safety considerations.

31375 **(DOE/JPL/1060—59) Standard description and costing methodology for the balance-of-plant items of a solar-thermal electric-power plant.** (Jet Propulsion Lab., Pasadena, CA (USA)). Jan 1983. 56p. (JPL-PUB—83-4). NTIS, PC A04/MF A01. Order Number DE83011240.

This report establishes standard descriptions for solar-thermal power plants and develops uniform costing methodologies for nondevelopmental balance-of-plant (BOP) items. The descriptions and methodologies developed are applicable to the major systems under development within the U.S. Department of Energy (DOE) Solar Thermal Program. These systems include the central receiver, parabolic dish, parabolic trough, hemispherical bowl, and solar pond. The standard plant is defined in terms of four categories comprising (1) solar energy collection, (2) power conversion, (3) energy storage, and (4) balance-of-plant (BOP). Each of these categories is described in terms of the type and function of components and/or subsystems within the category. A detailed description is given for the BOP category. BOP contains a number of nondevelopmental items that are common to all solar thermal systems. A standard methodology for determining the costs of these BOP items is presented in the form of cost equations. A set of baseline values for the normalized cost factors is also given. These baseline values were selected for use in making comparative assessments of different solar options. For determining the BOP costs for a particular plant at a specified site, the various cost factors must be chosen to meet site-specific requirements. The basis for the derivation of the cost equations and the rationale used in selecting values for cost factors involved in these equations are discussed. An example using the derived BOP methodology is also presented. Future evolution of the BOP methodology is suggested.

1404 Environmental, Legal, And Institutional Aspects

REFER ALSO TO CITATION(S) 31374

31376 **(UCID—19615) Use of MATHEW/ADPIC for the evaluation of the environmental impact of proposed OTEC plants. Phase I. Final report.** Rosen, L.C.; Lange, R.; Walker, H. (Lawrence Livermore National Lab., CA (USA)). Nov 1982. Contract W-7405-ENG-48. 183p. NTIS, PC A09/MF A01. Order Number DE83011419.

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The MATHEW/ADPIC models are employed in the first phase of a project to evaluate the environmental impact of proposed OTEC plants off the coast of Hawaii. The MATHEW/ADPIC models developed to assess regional plume transport in the atmospheric boundary layer are described. The code modifications of MATHEW/ADPIC required for the OTEC calculation are detailed. A number of test cases are examined. The calculations indicate that the MATHEW/ADPIC codes may be utilized to provide physically reasonable results for the hydrological problems considered.

1405 Solar Energy Conversion

REFER ALSO TO CITATION(S) 31369, 31371, 31531, 31983, 32181, 32182, 32510

31377 **(CONF-830614—3) Structural and mechanistic studies of natural and artificial photosynthesis.** Norris, J.R.; Bowman, M.K.; Thurnauer, M.C.; Wasielewski, M.R. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83010745.

From 7. DOE solar energy research conference; San Francisco, CA, USA (1 Jun 1983).

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One approach to the utilization of solar energy is the development of devices that mimic natural photosynthesis. Such artificial photosynthesis efforts would be aided by a better understanding of the primary photochemical steps that occur in the natural process of photosynthesis. As a result our studies emphasize the mechanistic and structural details of natural photosynthesis that appear to be crucial to the design of artificial solar energy devices. At the same time molecules are synthesized to serve as biomimetic models of natural energy conversion molecules. The photophysics and photochemistry of these molecules are investigated with primary emphasis on light induced electron transfer reactions. The information derived from studies of these models is integrated with that obtained from the natural photosynthetic process in an iterative fashion that leads to better understanding of both the natural and laboratory photosynthetic systems.

31378 (CONF-8109203—, pp vp) **Biomass as an energy carrier.** Laistner, H. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

A survey is given of the various applications of biomass which is an always growing raw material serving energy production. Wood and wood wastes, sewer gas and deposit gas, pyrolysis and the anaerobic digestion of agricultural wastes are topics presented briefly.

31379 **(CONF-8206179—3) Wood as a source of energy to 1990.** Zerbe, J.I. (Forest Products Lab., Madison, WI (USA)). Jun 1982. 7p. American Society of Agricultural Engineers, St. Joseph, MI 49085.

From American Society of Agricultural Engineers summer meeting; Madison, WI, USA (27 Jun 1982).

Today less than 2 percent of the energy consumed in the United States is produced from wood. By 1990 this could increase to about 5 percent. Using more lower value wood for energy can support better management on farm woodlots as well as large forests.

31380 **(DOE/CS/83001—1) Catalysts for alcohols from biomass. Final technical report, February 1980-January 1983.** Klier, K.; Herman, R.G.; Simmons, G.W. (Lehigh Univ., Bethlehem, PA (USA). Center for Surface and Coatings Research). Mar 1983. Contract AC02-80CS83001. 57p. NTIS, PC A04/MF A01. Order Number DE83010989.

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Modification of the Cu/ZnO = 30/70 mol % methanol synthesis catalyst by incorporation of Mn, Fe, Co, Rh, and Pd by aqueous coprecipitation from nitrate solutions or by impregnation of the binary catalyst with metal carbonyls from organic media resulted in a lowering of the carbon conversion of synthesis gas to products. Of the coprecipitated ternary catalysts, the Fe/Cu/ZnO samples exhibited the largest change in selectivities, which was toward the formation of higher alcohols and hydrocarbons. It was demonstrated that the alcohols are formed as primary products and are produced at high rates over a Fe/Cu/ZnO catalyst containing 1 mol % iron than over Fischer-Tropsch catalysts. The catalysts that were prepared by impregnation of metal carbonyls onto the surface of reduced Cu/ZnO catalysts exhibited very low catalytic activities. However, it was shown that the activities of the Rh catalysts were increased by the utilization of elevated pressures. The effects of CO_2 and H_2O in the H_2/CO synthesis gas on the methanol yield over the binary Cu/ZnO catalyst were investigated.

31381 (DOE/JPL—1012-80) Photovoltaic research and development in Japan. Shimada, K. (Jet Propulsion Lab., Pasadena, CA (USA)). 15 Feb 1983. Contract AI01-76ET20356. 35p. (JPL-PUB—83-8). NTIS, PC A03/MF A01. Order Number DE83011239.

The status of the Japanese photovoltaic (PV) R and D activities has been surveyed through literature searches, private communications, and site visits in 1982. The results show that the Japanese photovoltaic technology is maturing rapidly, consistent with the steady government funding under the Sunshine Project. Two main thrusts of the Project are: (1) completion of the solar panel production pilot plants using cast ingot and sheet silicon materials, and (2) development of large area amorphous silicon solar cells with acceptable efficiency (10 to 12%). An experimental automated solar panel production plant rated at 500 kW/yr is currently under construction for the Sunshine Project for completion in March 1983. Efficiencies demonstrated by experimental large area amorphous silicon solar cells are approaching 8%. Small area (< 5 cm^2) amorphous silicon solar cells are, however, currently being mass produced and marketed by several companies at an equivalent annual rate of 2 MW/yr for consumer electronic applications. There is no evidence of an immediate move by the Japanese PV industry to enter extensively into the photovoltaic power market, domestic or otherwise. However, the photovoltaic technology itself could become ready for such an entry in the very near future, especially by making use of advanced process automation technologies.

31382 (DOE/JPL/956034—81/1) Analysis and evaluation in the production process and equipment area of the low-cost solar-array project. Final report. Wolf, M. (Jet Propulsion Lab., Pasadena, CA (USA)). 30 Apr 1982. Contract NAS-7-100-956034. 68p. NTIS, PC A04/MF A01. Order Number DE83011263.

Two solar cell process sequences are compared. A fan-shaped metallization pattern is found to be as close to optimized as can be expected. A study of the minority lifetimes in dependence on the impurity concentration is reported. An investigation of minority carrier lifetime measurement methods leads to the conclusion that all methods are afflicted by two sources of error: effects which lie outside of the portion of the sample for which lifetime measurements are desired, and effects which originate from the desired portion but which alter the signal which would be attributable only to the bulk minority carrier lifetime. Most prevalent among the latter are surface recombination effects. (LEW)

31383 (DOE/NASA/20485—11) Array-structure design handbook for stand-alone photovoltaic applications. Didelot, R.C. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Oct 1980. Contract AI01-76ET20485. 242p. (NASA-TM—82629). NTIS, PC A11/MF A01. Order Number DE83011596.

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This handbook will permit the user to design a low-cost structure for a variety of photovoltaic system applications under 10 kW. Any presently commercially available photovoltaic modules may be used. Design alternatives are provided for different generic structure types, structural materials, and electric interfaces. The use of a hand-held calculator is sufficient to perform the necessary calculations for the array designs.

31384 (ENEA-RT/BIO—82-23) Anaerobic digestion process: analysis of biochemical and microbiological aspects. Di Giorgio, G.; Gamboni, M.; Sprocati, A.R. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Fonti Alternative Rinnovabili e Risparmio Energetico). 1982. 81p. (In Italian). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83901914.

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The development of a new technology of Biomethanation can be carried out by the process revision in order to utilize it, as the main aim for the energy production, rather than for environmental purposes. It is necessary to develop a proper biochemical and microbiological knowledge of the conversion to methane of different biomass. By the study of three stages of anaerobic digestion, it appears that the hydrogen concentration is the regulator key of the whole process within the digesters.

31385 (EUR—8142-EN) Optimisation of new types of MIS silicon solar cells. Final report. Van Overstraeten, R.; Mertens, R. (Louvain Univ. (Belgium)). 1982. 46p. European Community Information Service, 2100 M Street N.W., Suite 707, Washington, DC 20037.

The work reported deals with grating MIS solar cells, one having an SiO_2 dielectric layer, and the other having a TiO_2 dielectric layer. Experiments were performed to investigate the improvements that result if a p^+ back surface field is incorporated into the p substrate on which MIS grating cells are made. Some preliminary results about MIS-TiO_2 cells on polycrystalline silicon prepared by either single-pass float zone or SILSO techniques are given. Specific advantages of MIS type structures on polysilicon substrates are enumerated. These include calculations of the short circuit current, open circuit voltage, fill factor, and efficiency. Relative advantages and disadvantages of the MIS/SIS structure are discussed. (LEW)

31386 (EUR—8155-DE) Formation of monocrystalline CdTe solar cells for terrestrial application. Phase II, Part I. Final report. Jaeger, H.; Fuessl, B.; Seipp, E. (Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)). 1982. 168p. (In German). European Community Information Serice, 2100 M Street, NW, Suite 707, Washington, DC 20037.

Investigations are reported concerning the systems p-ZnTe/n-CdTe and n-CdS/p-CdTe. Only very poor open-circuit voltages and fill factors are reported for the p-ZnTe/n-CdTe system, and the transparency of the ZnTe layers is found to be too small. The CdS/CdTe system was found to be more successful, with efficiencies reported as high as 7.4%, open circuit voltage up to 840 mV, short circuit current up to 17.0 mA/cm^2, and fill factor as high as 0.727. A structure of ITO/CdTe exhibited a short-circuit current density of 19 mA/cm^2. All cells are fabricated by depositing antipolar heterolayers on CedTe. (LEW)

31387 (EUR—8207-FR) Study and construction of the epitaxial growth of compound III.V by mixed organometallic and hydride pyrolysis under reduced pressure: application to the study of solar photovoltaic cell structure. Final report. Gave, G.; Le Metayer, M.; Orgeret, M. (Centre National d'Etudes Spatiales, 31 - Toulouse (France)). 1982. 22p. (In French). Commission of the European Communities, 2100 M St., NW, Suite 707, Washington, DC 20037.

A study is made of the epitaxial growth of gallium arsenide by means of an organometallic chemical reaction in the vapor phase under low pressure. This technique is studied with respect to constructing solar photovoltaic cells. 8 figures, 2 tables.

31388 (EUR—8212-EN) Growth of silicon on a liquid-metal layer. Final report. Bloem, J.; Giling, L.J.; Graef, M.W.M.; Maes, J.W.C.; de Moor, H.H.C.; Monkowski, J.R. (Katholieke Univ. Nijmegen (Netherlands)). 1982. 35p. European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

Since 1976 the deposition of silicon on top of a liquid surface has been investigated with the goal of growing inexpensive, large-grain polycrystalline films. A technique for this purpose was developed and is described. In the course of the period 1978 to 1979, this process was improved by the in situ deposition of a liquid layer (viz. tin) prior to the deposition of silicon. This makes it possible that the complete preparation of the base layer can be executed in a single apparatus. The growth mechanism was studied and characterized. It could be shown that the growth of silicon from the tin solution is responsible for the large grains obtained. Investigations into the electrical properties of the layers enabled the construction of a model that accounts for the electronic phenomena in polycrystalline silicon.

31389 (NE—1980-13) Compilation and mapping of methods for biomass conversion. (SEE CODE- 9860056 Naemnden foer Energiproduktionsforskning, Stockholm (Sweden)). 1980. 101p. (In Swedish). NTIS (US Sales Only), MF A01. Order Number DE82902532.

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Information is given on projects undertaken at the Swedish Energy Production Research Institute on biomass conversion projects, including studies in pyrolysis, partial oxidation, bioconversion, hydrolysis, and carboxylisis. 34 references.

31390 **(NE-PROJ—3065-472) Biological combustion in the Joenkoepings District, Sweden: overall inventory.** (Viak AB, Vaellingby (Sweden)). Sep 1980. 466p. (In Swedish). NTIS (US Sales Only), PC A20/MF A01. Order Number DE82903365.

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Information is given on the organization, development, and utilization of energy resources, including district heating, industrial and public building heating systems, biofuel sources, fuel combustion, and biomass conversion. A classification is made of the various biomass sources, including metal ore, soil categories, and degree of forestation.

31391 **(SAND—81-7193) Photovoltaic-array field optimization and modularity study.** Naff, G.J. (Hughes Aircraft Co., Los Angeles, CA (USA)). Mar 1983. Contract AC04-76DP00789. 370p. NTIS, PC A16/MF A01. Order Number DE83011337.

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This final report describes the development of low cost photovoltaic array fields using a modular building block approach. Desired safety, maintenance, and operational features are provided with this expandable modular design concept. The building block is a +-200 Vdc bipolar branch circuit with a nominal power rating of 10 kW. A low cost hybrid structure/foundation is used featuring a frameless panel and a self grounding foundation. Power from each branch circuit is routed via direct burial cables to a power collection center. The field is sectionalized into 20 kW units with protection and controls provided for each section. The life cycle cost estimates for a 100 kW field using this modular concept (excluding solar cell modules) is less than $100/m^2$ in 1980 dollars.

31392 **(SERI/TR—8032-1-T2) Development of polycrystal GaAs solar cells. Final report, 01/15/79-09/30/80.** Miller, D.L.; Cohen, M.J.; Harris, J.S. Jr.; Ballantyne, J.; Hoyte, A.; Stefanakos, E. (Rockwell International Corp., Thousand Oaks, CA (USA). Microelectronics Research and Development Center; Cornell Univ., Ithaca, NY (USA); Howard Univ., Washington, DC (USA); North Carolina Agricultural and Technical State Univ., Greensboro (USA)). Oct 1981. Contract AC02-77CH00178. 129p. NTIS, PC A07/MF A01. Order Number DE83006113.

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The objective of this program was to develop a thin-film GaAs solar-cell technology with the potential of yielding cells with 12 to 15% efficiency and to develop thin-film growth techniques compatible with the low-cost production goal of $500/KW/sub p/. Major emphasis in this program has been on developing new polycrystal growth techniques, developing new analytical techniques to study grain boundaries, fundamental studies of physical mechanisms by which grain boundaries limit solar-cell performance, and development of processing techniques and cell designs that minimize the effects of grain boundaries on solar-cell performance. Molecular-beam epitaxy (MBE) has proven to be a very attractive technique for fundamental studies of both grain boundaries and new device structures. The key to realizing higher cell efficiency is to develop a combination of a crystal growth and grain-boundary passivation technique and/or solar-cell-device designs that effectively eliminate the adverse effects of grain boundaries on cell performance. Several high-spatial-resolution analytical techniques have been developed on this program and provided experimental information on the electrical properties of grain boundaries. A summary of these techniques and their applicability to solar-cell research is provided as well as specific results of these measurements. Device design and fabrication has focused on the AlGaAs/GaAs heterojunction Schottky-barrier cell. A thorough investigatioin of Schottky-barrier height enhancement and cell performance as a function of AlGaAs composition, thickness and doping was carried out. The predominant effect appears to be very high generation-recombination current created by some grain boundaries.

31393 **(SERI/TR—8104-4-T5) Low-cost process for p-n junction-type solar cell. Final report, March 1, 1981-May 31, 1982.** Mooney, J.B.; Bates, C.W. Jr. (Stanford Univ., CA (USA)). May 1982. Contract AC02-77CH00178. 39p. NTIS, PC A03/MF A01. Order Number DE82020947.

Significant progress has been made in the preparation of films and devices for both the spray pyrolyzed and the screen printed and sintered cells. In the spray program, indium-doped CdS films with thicknesses of less than 0.1 cm have been reproducibly deposited. The key to the efficient doping is in the control of the ratio of cadmium chloride to thiourea. We have, for the first time, deposited the chalcopyrite form of $CuInSe_2$ both on glass and on molybdenum-coated glass. The resistivity of the deposit has been varied through the spray conditions and variations in the amount of copper. Photovoltaic efficiency of the sprayed cell has gradually increased to 2.3 percent, and a significant improvement with time has been observed. The photovoltaic response of the sintered cell has also been improved, although it is still below 1 percent efficiency. It is apparent that the contact to the CdTe layer and the conditions for its conversion to p-type with copper addition to the graphite electrode is critical. The cell response of both types of cells has been studied by a variable-frequency impedance technique. The significant problems for the sprayed cell are low shunt resistance and high dark current, while for the sintered cell there is a high series resistance and a significant interface state density of low time constant. Thermodynamic and chemical kinetic considerations of the sintering process are presented.A study of the effect of Cd/S ratio and hydroxylamine content on the spray-pyrolysis deposition of CdS was conducted using the free energy minimization computer program.

31394 **Matching the characteristics of batteries with solar cell modules.** Gay, C.F. (Arco Solar Inc., Chatsworth, CA (USA)); Kapur, V.K.; Pyle, B.; Rumburg, J.; Manfredi, A. pp 335-339 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

The characteristics of the storage battery commonly used in worldwide photovoltaic applications with those of the photovoltaic generator and of the solar source are put together. The natural matching of these characteristics may be exploited in meeting the typical requirements of the user. If the module is properly designed, and if due care is taken in battery installation for passive temperature control, there is no need for complex regulation or periodic adjustment. A well-designed photovoltaic module can function as both generator and controller, providing enhanced system reliability, lower system cost, and simpler operation for the user. The critical design parameter, the charging voltage delivered to the battery by the module, is determined by the number of cells in the series string.

31395 **Fabrication of large area copper sulfide/cadmium sulfide thin film solar modules.** Huschka, H.; Schurich, B.; Woerner, J. (NUKEM G.m.b.H., Hanau (Germany, F.R.)). pp 399-403 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

Thin film photovoltaic generators based on the heterojunction system copper sulfide/cadmium sulfide are the most developed alternative to Si solar cells. The results and experience obtained prove the copper sulfide/cadmium sulfide cell to be a stable and highly reliable element with good conversion efficiencies. To demonstrate the feasibility of a large scale production a pilot plant was built by NUKEM. Most conventional methods and techniques are used for this line. It is expected that such a generator could reach the price goal which was defined for economic operations.

31396 **Performance of 1KW peak concentrating photovoltaic array.** Sala, G.; Chenlo, F. (Universidad Politecnica de Madrid (Spain). Inst. de Energia Solar). pp 217-221 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

The R.A. concentrating photovoltaic array is developed and constructed in Madrid, under the sponsorship of the Ramon Areces Foundation. During its first year of operation electrical, optical and mechanical performances and efficiency were measured. The overall efficiency is 4%. This low value is due to non-uniform illumination and to dispersion of the solar cell characteristics.

31397 **Photovoltaic concentrator module characterization.** Gerwin, H.J. (Sandia National Labs., Albuquerque, NM (USA)). pp 222-226 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

A number of photovoltaic (PV) concentrator module designs have been tested under similar conditions, and the results are presented to show meaningful performance characteristics. The concentrator designs include actively cooled linear parabolic troughs and linear Fresnel lenses, as well as passively cooled point-focus Fresnel lenses. These modules were produced within the past three years and represent significant improvements over earlier concentrator designs. All testing was performed with natural sunlight in the Sandia National Laboratories test facility in Albuquerque, New Mexico. Each module was run through a series of standard tests to determine performance at normal operating and off-design conditions. These tests included maximum power tracking under a range of insolation values and temperature variations. Complete current-voltage scans were made at frequent intervals throughout the test period for each module. Using a multiple linear regression analysis technique, maximum power efficiencies were determined by normalizing the operating points for direct normal insolation (800 W/m2) and average cell temperature (28 degr. C). The test facility and several of the more interesting modules/arrays and their characteristics are shown in photographs and diagrams.

31398 **Results from a test facility for solar cells in Sweden.** Hedstroem, J.; Kaellbaeck, B.; Sigurd, D. (Institute of Microwave Technology, Stockholm (Sweden)). pp 227-231 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

A 1 kW photovoltaic test facility has been built about 20 km north of Stockholm. The test station which has been in operation for nearly 3 years, is equipped with 5 different types of commercial solar cell modules, chosen to be representative for different kind of cell encapsulation methods. The main objective of this work has been to study how solar cell modules perform in the Swedish climate, both with respect to power output and degradation. The most important results are that one 1 kWp photovoltaics generate 1000 kWh per year, effects of dust accumulation and snow coverage included, and that no degradation of the different modules is seen, except in one case where a module has a broken interconnection. Calculations based on the measurements show that if a solar cell is loaded at an optimum constant voltage the energy generated per year would be 96% of what is achieved with peak power tracking.

31399 **A microprocessor-based instrument for automatic solar cell characterization.** Cardinali, G.C.; Faldella, E. (CNR, Bologna (Italy). Ist. LAMEL). pp 232-236 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

A microprocessor-controlled instrument for automatic characterization of photovoltaic cells is described. Accuracy, speed and flexibility, especially as regards run-time selection of measurement and data processing modalities, represent the main characteristics of the proposed system. As output the instrument provides plots of the current-voltage and power-voltage curves, together with information related to the measured data, such as cell fill factor and efficiency. The system turned out to be particularly useful for automatic classification and selection of photovoltaic cells for solar panels.

31400 **Array structures for fixed flat-plate photovoltaic power generators.** Grassi, G. (Commission of the European Communities, Brussels (Belgium)). pp 248-257 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

Support structures for photovoltaic arrays are minor elements of the photovoltaic systems but, in the near future, low cost solutions must be developed to obtain a better and satisfactory cost balance between the various system components if a large penetration of photovoltaic power generators is to be encouraged. A programme of 15 photovoltaic pilot projects is now under construction in many member states of the European Community. The total cost of the programme is 30 million ECU, the total peak power is approximately 1100 KW, the power range being between 30 and 300 KWp. After a review of different solutions proposed for the photovoltaic pilot projects of the Commission, a new type is presented of light weight flexible and economical array support structure, made of natural or treated timber and steel wire, which is presently being experimentally investigated on a field of about 3 ha. The utilization of such materials will certainly help to minimize the visual impact on the environment, this being one of the objectives of the pilot plants sponsored by the Commission of the European Communities. Preliminary forecasts suggest an installed cost of about 0,2 ECU/Wp to compare with the cost of about 0,5-1,7 ECU/Wp relating to several solutions proposed in the framework of the photovoltaic pilot projects programme of the Commission. (1 ECU, European Counting Unit, is approx. $1).

31401 **Reverse bias power dissipation of shadowed or faulty cells in different array configurations.** Spirito, P. (Naples Univ. (Italy). Ist. Elettrotecnico); Albergamo, V. pp 296-300 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

An analysis has been made of the maximum power dissipation in reverse biased shadowed (or faulty) cells. The results of the analysis are presented for different series-parallel configurations; for each case the bias point of the shadowed cell is determined as a function of the 'shadowing degree', defined as the ratio between the Isc of the shadowed cell and the Isc of the illuminated ones. The maximum power dissipation allowable for the cell in a given module is computed by using the NOCT values of the module itself. The results show that a large paralleling of cells can lead to severe stresses if more than one cell is shadowed, and to a greater sensitivity to the 'hot spot' phenomenon.

31402 Niche differentiation between two rhizomatous plant species: Typha latifolia and Typha angustifolia. Grace, J.B.; Wetzel, R.G. (Michigan State Univ., Hickory Corners). *Canadian Journal of Botany;* 60: No. 1, 46-57(1982). Contract AC02-76EV01599.

Morphological characteristics and biomass allocation were examined for two species of Typha in a small pond. Typha latifolia differed from T. angustifolia in having shorter leaf height, wider leaves, greater leaf surface area, greater allocation to leaves, greater number of smaller rhizomes, greater allocation to vegetative reproduction, smaller allocation to sexual reproduction, and fewer number of flowering plants. For both species, those plants growing in deeper water had taller leaves, a greater allocation to leaves, and a decreased allocation to sexual and vegetative reproduction. Previous studies of these populations have demonstrated that these two species are segregated according to water depth with T. latifolia being competitively superior in shallow water (less than 15 cm) but T. angustifolia having the potential to grow in deeper water than T. latifolia. Results from this study indicate that T. latifolia is competitively superior in shallow water because of its greater leaf surface area but that T. angustifolia's tall narrow leaves and large rhizome storage permit it to grow in deeper water than T. latifoia. The greater amount of sexual reproduction in T. angustifolia is correlated with its more restricted distribution and fugitive nature.

31403 Cross diffusion of Cd and Zn into Cu_2S formed on ZnCdS thin films. Burton, L.C.; Uppal, P.N.; Dwight, D.W. (Virginia Polytechnic Inst. and State Univ., Blacksburg). pp 780-786 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Cd and Zn compositions in Cu_2S formed on ZnCdS by means of ion-exchange have been measured using Auger electron spectroscopy, atomic absorption spectroscopy and electron stereoscopic chemical analysis. Net concentrations of Cd and Zn in as-formed Cu_2S are generally in the 10 to the 18th - 10 to the 19th/cu cm range. Heat treatments raise the concentrations by over an order of magnitude, with Zn concentrations at the Cu_2S surface and near the Cu_2S/ZnCdS interface increasing more than those of Cd. The increased Zn surface concentration is accompanied by increased oxygen. Following heat treatment, Cd and Zn concentrations in the Cu_2S 'bulk' are found to be less than 10 to the 19th and 10 to the 20th/cu cm, respectively.

31404 Model for field and light dependent effects in a-Si solar cells. Rothwarf, A. (Drexel Univ., Philadelphia, PA). pp 690-693 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—). Contract FG02-80CS83105.

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A model of hydrogenated glow discharge deposited amorphous silicon in a p-i-n solar cell structure is analyzed. The key feature of the model is that the compensated i-layer consists of donor-like states above and acceptor-like states below the Fermi level. In the p-i-n solar cell, charge stored in these levels create high field space charge regions near the n and p contacts, and depending upon the total thickness of the i-layer there can be a field free 'dead layer' in the center of the cell. The dark current voltage relation is derived based on recombination in the 'dead layer'. Under illumination a redistribution of charge in the band gap states occurs that affects the current-voltage relation and causes the light generated current to be sensitive to both voltage and spectral content. Prolonged exposure to light or any other process that changes the density or distribution of the gap states will affect solar cell characteristics.

31405 The effect of fluorine on the performance of amorphous silicon solar cells. Carlson, D.E.; Smith, R.W. (RCA Labs., Princeton, NJ). pp 694-697 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The role of fluorine in amorphous silicon has been investigated by studying the effects of adding various fluorine-containing gases (SiF_4, HF and F_2) to a SiH_4 discharge during the deposition of doped layers and during the fabrication of p-i-n solar cells. The resistivity of phosphorus-doped films can be reduced somewhat by the addition of fluorine-containing gases to the discharge, but for boron-doped films the resistivity is always increased. The conversion efficiency of p-i-n solar cells is not significantly affected when fluorine-containing gases are present during the deposition of the p or n layer, but the performance generally falls when these gases are present during the deposition of the undoped layer.

31406 Photovoltaic behavior of amorphous Si:H and Si:F:H solar cells. Kuwano, Y.; Ohnishi, M.; Nishiwaki, H.; Tsuda, S.; Shibuya, H.; Nakano, S. (Sanyo Electric Co., Ltd., Hirakata, Osaka, Japan). pp 698-703 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A new fabrication process for the a-Si solar cell has been developed. P, i, and n layers are deposited in consecutive, separated reaction chambers in this process. The photovoltaic behavior of a-Si:H and a-Si:F:H solar cells which were fabricated by a glow discharge reaction in SiH_4, and in SiF_4+SiH_4, respectively, is investigated. It is found that the photovoltaic performance of the a-Si:H solar cell is strongly influenced by the intensity of the incident light. Also analyzed is the electric power loss of three types of integrated cell modules by means of a distributed constant model.

31407 A realistic comparison of minimum photovoltaic module cost projections. Coleman, M.G.; Grenon, L.A. (Motorola, Inc., Phoenix, AZ). pp 713-717 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Some long-term cost projections for thin film photovoltaic devices indicate a major advantage for these technologies over crystalline silicon photovoltaics, ultimately replacing silicon as the predominant material. This paper addresses the assumptions made for the thin film cost projections and compares them with the analogous assumptions for silicon. Analysis of cell manufacturing, encapsulation, and balance of systems costs are performed to show that it is unlikely that the thin film materials, even if free, will ever realize a cost advantage in photovoltaic systems over silicon.

31408 The Solarex Block IV module. Hoelscher, J.F. (Solarex Corp., Rockville, MD). pp 745-749 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981).

Several innovative concepts were introduced for the Block IV contract. Semicrystalline silicon manufactured by SEMIX Inc. is the basic cell material. A front metallization pattern combined with a wraparound-style interconnect and in-plane stress relief combine to provide a new method to reliably accomplish series-paralleling. Laminated modules using Ethylene Vinyl Acetate (EVA) as the encapsulant were manufactured for the first time.

31409 Thermal and optical performance of encapsulation systems for flat-plate photovoltaic modules. Minning, C.P. (Hughes Aircraft Co., Culver City, CA); Coakley, J.F.; Perrygo, C.M. pp 750-755 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The electrical power output from a photovoltaic module is strongly influenced by the thermal and optical characteristics of the module encapsulation system. Described are the methodology and

computer model for performing fast and accurate thermal and optical evaluations of different encapsulation systems. The computer model is used to evaluate cell temperature, solar energy transmittance through the encapsulation system, and electric power output for operation in a terrestrial environment. Extensive results are presented for both superstrate-module and substrate-module design schemes which include different types of silicon cell materials, pottants, and antireflection coatings.

31410 **Losses in Cu_2S-CdS sprayed solar cells.** Savelli, M.; Luquet, H.; Bougnot, J.; Perotin, M.; Gril, C.; Marucchi, J. (Montpellier II, Universite, France). pp 767-771 of Conference Record, Photovoltic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Attention is given to the recent evolution in the photovoltaic performances of Cu_2S-CdS sprayed solar cells (backwall structure). An efficiency of 7.4 percent with a short-circuit current of 23 mA and an open circuit voltage of .450 volt for an area of 1 sq cm under AM1 have been observed.

31411 **Investigation of the reliability of sprayed backwall Cu_2S/CdS solar cells for terrestrial applications.** Castel, E.D.; Soubeyrand, M.J. (Photon Power, Inc., El Paso, TX). pp 772-776 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The salient results of recent accelerated life-test studies are presented. No degradation of short-circuit current is observed. The electrical output of the device shows a slight initial decay and levels off at a level which depends upon the temperature at which the test was conducted. The degradation results from an erosion in series resistance and open-circuit voltage. As far as its aging characteristics are concerned, the device is found to be insensitive to light, UV exposure or thermal cycling. The only two significant stress factors are humidity (in the presence of oxygen) and elevated temperatures. All tests were performed on unencapsulated cells.

31412 **10% conversion efficiency in thin film polycrystalline cadmium-zinc sulfide/copper sulfide solar cells.** Hall, R.B.; Birkmire, R.W.; Phillips, J.E.; Meakin, J.D. (Univ. of Delaware, Newark). pp 777-779 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Thin film cadmium-zinc sulfide/copper sulfide solar cells have been developed with conversion efficiencies greater than 10% in direct sunlight. The development of these cells was based on decreasing the electron affinity mismatch between the Cu_2S and CdS and thereby raising the open-circuit voltage above that achievable with the standard CdS/Cu_2S solar cell. The electron affinity of the CdS was reduced by the incorporation of Zn by the co-evaporation of CdS and ZnS. With improved preparation of Cd(1-x)Zn(x)S (with x between .1 and .2) films, and the same process that produced Cu_2S/CdS cells with efficiencies in excess of 9%, the increased open-circuit voltage has led to efficiencies greater than 10%.

31413 **Cu_2S/CdS cell degradation - Lateral diffusion effects.** Zwicker, H.R.; Brickman, L.A.; Hadley, H.C.; Matysik, K.J. (SES, Inc., Newark, DE). pp 787-792 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Certain thin-film Cu_2S/CdS cells operated into load under illumination degrade by loss of I(sc), with no loss of V(oc) or FF. These devices suffer loss of average stoichiometry accompanied by grid structure-related variation in local J(sc), which is here associated with lateral ion (copper) migration in a direction towards the grid system. A theoretical model based on balancing field-driven Cu(+) ion motion against a restoring diffusive flow accounts for the major measured features of this form of degradation.

31414 **Atomic absorption analysis and Auger depth profiles of heat-treated polycrystalline Cu(x)/CdS solar cells.** Florio, J.V. (SES, Inc., Newark, DE); Ramos, F.G. pp 793-799 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The degradation of Cu(x)S stoichiometry on thin film Cu(x)S/CdS substrates in oxygen ambients is shown to be due predominately to the growth of a dilute acid-soluble cadmium/oxygen phase rather than a copper oxide phase. The change in stoichiometry is quantitatively related by the following reaction: $x/2\ O_2 + Cu_2S + xCdS$ yields $Cu(2-2x)(+)Cu(2x)(2+)S(1+x)XCdO$. The junctions were depth profiled to assess the effect of reducing and oxidizing heat treatments on the junction: a reducing treatment decreased the Cd concentration in the Cu(x)S film whereas an oxidizing treatment increased the Cd concentration in the Cu(x)S, mainly at the vacuum/Cu(x)S interface. The transport of Cd to the surface was accompanied by a redistribution in the diffuse interfacial region between Cu(x)S and CdS.

31415 **Development of a 9.4% efficient thin-film $CuInSe_2$/CdS solar cell.** Mickelsen, R.A.; Chen, W.S. (Boeing Aerospace Co., Seattle, WA). pp 800-821 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The development of a polycrystalline, thin-film solar cell utilizing a heterojunction structure based upon N-type CdS and P-type $CuInSe_2$ semiconductor materials is described. The cell, prepared entirely by vacuum deposition and sputtering techniques onto inexpensive substrates, has potential applications as a low-cost, mass produced device for photovoltaic power generation systems. A device efficiency of 9.5% with photocurrents in excess of 35 mA/sq cm under simulated AM-1 illumination is reported for a total semiconductor film thickness of approximately 5-microns. Results of cell characterization including I-V and spectral responses are presented. Finally, the effects of cell heat treatment are described which indicate the importance of oxygen in improving the cell response.

31416 **Some tests of flat plate photovoltaic module cell temperatures in simulated field conditions.** Griffith, J.S.; Rathod, M.S.; Paslaski, J. (California Inst. of Tech., Pasadena). pp 822-830 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The nominal operating cell temperature (NOCT) of solar photovoltaic (PV) modules is an important characteristic. Typically, the power output of a PV module decreases 0.5% per deg C rise in cell temperature. Several tests were run with artificial sun and wind to study the parametric dependencies of cell temperature on wind speed and direction and ambient temperature. It was found that the cell temperature is extremely sensitive to wind speed, moderately so to wind direction and rather insensitive to ambient temperature. Several suggestions are made to obtain data more typical of field conditions.

31417 **Effects of cell sorting and module matching on array output.** Lambarski, T.J. (BDM Corp., Albuquerque, NM); Kadlec, D.L. pp 841-844 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

As a result of differences between the individual cells of a photovoltaic (PV) array with respect to the obtainable short circuit current, the power output provided by such an array is reduced in comparison to the output obtained in the ideal case of cells with uniform characteristics. The sorting of cells into bins according to the value of the cell short circuit current and the use of cells from only one bin within a given module can improve the power output of the modules. However, module matching within a series string may be required to preserve this improvement. The present investigation is concerned with an assessment of the effectiveness of this sorting and matching technique. Attention is given to the best possible output obtainable in the case of cells with identical characteristics, and the improvements achieved for assemblies of cells with nonuniform properties by means of bin sorting.

31418 **A theory of the n-i-p silicon solar cell.** Goradia, C. (Cleveland State Univ., OH); Weinberg, I. pp 855-860 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Ind. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A computer model has been developed, based on an analytical theory of the high base resistivity BSF n(+)(pi)p(+) or p(+)(nu)n(+) silicon solar cell. The model makes very few assumptions and accounts for nonuniform optical generation, generation and recombination in the junction space charge region, and bandgap narrowing in the heavily doped regions. The paper presents calculated results based on this model and compares them to available experimental data. Also discussed is radiation damage in high base resistivity n(+)(pi)p(+) space solar cells.

31419 **Effect of high level conditions on the open circuit voltages of P(+)-N-N(+) and N(+)-P-P(+) back surface field silicon solar cells.** Singh, S.N.; Jain, G.C. (National Physical Lab. of India, New Delhi). pp 861-866 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The effect of high level conditions on the open circuit voltages of front illuminated P(+)-N-N(+) and N(+)-P-P(+) back surface field (BSF) silicon solar cells has been investigated. It has been found out that volume recombination can have a decisive effect on the open circuit voltages of BSF cells. In general, V sub OC of a P(+)-N-N(+) cell is higher than the V sub OC of an N(+)-P-P(+) cell and this difference increases with increase in volume recombination. However, the open circuit voltages of the two cells tend to be equal for a negligible volume recombination. This is perhaps the reason that the best P(+)-N-N(+) and N(+)-P-P(+) BSF cells have exhibited nearly equal open circuit voltages in practice.

31420 **Optical confinement in thin Si-solar cells by diffuse back reflectors.** Goetzberger, A. (Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung, Freiburg im Breisgau, West Germany). pp 867-870 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Recently it has been realized that high efficiency Si-cells should be very thin and should have minority carrier and optical confinement. It is suggested here that a diffuse back reflector with cosine characteristic which should be simple technologically is a good choice for confinement. Because of the high index of refraction only 8.55 % of the reflected distribution is lost by reradiation. The total absorption efficiency can be obtained by summation of a geometric series. A cell of 15 microns thickness with diffuse reflector should be equal in absorption efficiency to conventional cell of more than 200 microns.

31421 **Theoretical limit efficiency of two junction tandem silicon-germanium solar cells intended for thermophotovoltaic application.** Vera, E.S.; Loferski, J.J.; Spitzer, M. (Brown Univ., Providence, RI). pp 877-882 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The principal conclusion of the reported investigation is that an overall conversion efficiency of 26% is possible for the considered two junction silicon/germanium cascade solar cell arrangement consisting of a silicon and germanium cell, less than 50 and 90 microns thick respectively receiving an overall input power density of 25 W/sq cm from a 2000 C blackbody radiation source. It is pointed out that there are basically two approaches to increasing efficiency through multijunction solar cell systems. In the spectrum splitting approach optical devices are used to separate the incident light into two or more spectral components which can be separately directed onto individual solar cells of different energy band gaps. In the tandem cell approach two or more solar cells of different energy band gaps are stacked in series.

31422 **Grating-type Si solar cell design and analysis.** Hwang, H.L. (National Tsinghua Univ., Hsinchu, Republic of China); Liu, D.C. pp 883-887 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Grating structures are expected to have considerably better spectral response to short wavelengths than in conventional diffused structures. This paper reviews the experimental results and design principles of grating Si cells. Numerical simulations were done to analyze the Si grating cell performance. The deep junction concept is in contrast to the conventional shallow junction cells. The computational results indicate that BSF are essential to be incorporated in the grating structure and the current output of a grating cell can be substantially increased by the incorporation of minority carrier mirrors.

31423 **Junction-field and collection efficiency in the current saturation range.** Boer, K.W. (Univ. of Delaware, Newark). pp 888-891 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981).

It is shown that the collection-efficiency of the emission current from the emitter depends on the junction (-emitter - interface) recombination, but not on the junction field. Only if the current from the emitter is limited by field-quenching within the junction can a field-dependence be expected in the current saturation range. Such correlation is observed for CdS/Cu_2S solar cells and judged as evidence for field-quenching. Means to increase the collection efficiency are suggested.

31424 **Optical and electrical properties of amorphous silicon-germanium alloy films.** Singh, P.; Galley, D.; Fagen, E.A.; Dalal, V.L. (Univ. of Delaware, Newark). pp 912-916 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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A comprehensive survey is undertaken of the optical and electrical properties of hydrogenated amorphous Si(x)Ge(1-x) alloy films in the range where x is greater than or equal to 0 and less than approximately 0.5, in anticipation of use in the rear or 'booster' cell of a monolithic tandem configuration with pure or lightly alloyed a-Si as the front cell. Results to date on undoped and lightly doped films indicate a monotonic variation of quantities governed by average composition, but intermediate maxima or minima may exist in quantities sensitive to scattering and recombination mechanisms. Systematic trends can be readily masked by unwanted impurities, emphasizing the importance of post-deposition quantitative analysis. A-Si and a-Ge films of exceptionally high conductiv-

ity, suitable for junction and contact layers, have been produced without the use of fluorine by adjustment of deposition parameters to promote reactive etching in the plasma.

31425 **Spectral response and capacitance measurements of a-Si solar cells.** Plaettner, R.D.; Pfleiderer, H.; Rauscher, B.; Kruehler, W.; Moeller, M. (Siemens AG, Forschungslaboratorien, Munich, West Germany). pp 917-921 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Hydrogenated, amorphous silicon was used for the implementation of solar cells. With pin/ITO solar cells efficiencies of up to 5.4% (AM1) were realized. To gain better insight into their performance characteristics, spectral response measurements were taken at AM1 background illumination and evaluated using a charge-collection model. The calculations yielded values for the drift length of electrons (0.8 micron) and holes (0.66 micron), for the diode quality factor (approximately 2), the saturation current I sub 0 (10 to the -9th A/sq cm), and the built-in voltage V sub 0 (0.88 V). Impedance measurements indicated that the space charge depletion width extends almost over the entire cell thickness (approximately 0.5 micron).

31426 **Conversion efficiency of large area a-Si:H solar cell.** Uchida, Y.; Sakai, H.; Nishiura, M.; Haruki, H. (Fuji Electric Corporate Research and Development, Ltd., Yokosuka, Kanagawa, Japan). pp 922-927 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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In hydrogenated amorphous silicon (a-Si:H) solar cells with an ITO/nip/SS structure, conversion efficiencies of 6.47%, 5.2% and 4.2% have been obtained for the cells with 1.2 sq cm, 49 sq cm, and 100 sq cm areas under AM1 illumination, respectively. The n-i-p a-Si:H layers have been prepared in a capacitive rf glow discharge apparatus. The decrease of the conversion efficiency with increasing cell area relates to decrease in the short circuit current J sub SC and the fill factor FF. It is found that J sub SC is lowered by the areal inhomogeneity of the a-Si:H layers and FF is lowered mainly by series resistance which comes from the ITO film and the grid electrodes.

31427 **Ribbon growth-cell processing - Synergistic effects.** Ravi, K.V.; Gonsiorawski, R.C.; Chaudhuri, A.R.; Rao, C.V.H.; Ho, C.T.; Hanoka, J.I.; Bathey, B.R. (Mobil Tyco Solar Energy Corp., Waltham, MA). pp 928-933 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The influence of ribbon growth conditions and solar cell processing variables on the conversion efficiency of EFG silicon ribbon solar cells have been examined. The key variable in crystal growth is the type of crucible employed for containing the molten silicon. It is observed that the use of quartz crucibles results in the highest solar cell efficiencies, whereas graphite crucibles result in reduced efficiencies. Processing conditions such as the diffusion temperature and diffusion source also have an important effect. Greater than 14% AM1 efficiencies in large area (approximately 50 sq cm) ribbon solar cells have been achieved.

31428 **Large-area silicon-on-ceramic substrates for low-cost solar cells.** Schuldt, S.B.; Heaps, J.D.; Schmit, F.M.; Zook, J.D.; Grung, B.L. (Honeywell Corporate Tech. Center, Bloomington, MN). pp 934-940 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The SCIM (Silicon-Coating-By-Inverted Meniscus) process to produce SOC (silicon-on-ceramic) substrates has been investigated for various growth conditions and substrate velocities (4-30 cm/min). Slotted mullite-based substrates (10-cm-wide by 100-cm-long) have been coated with smooth, continuous silicon layers, with thicknesses in the range from 100 to 300 microns. Thermal stress (which can be a problem at low velocities) is prevented by proper thermal design. The highest SCIM-coated SOC cell efficiencies to date are 7.5% (AM1, AR) as compared to 10.5% (AM1, AR) for dip-coated SOC cells. Substantial improvements in cell efficiency are expected when high purity parts are installed in the SCIM-coater.

31429 **Recent advances in silicon sheet growth by the Ribbon-to-Ribbon (RTR) process.** Sarma, K.R.; Gurtler, R.W.; Legge, R.N.; Ellis, R.J.; Lesk, I.A. (Motorola, Inc., Phoenix, AZ). pp 941-948 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Significant advances are reported in Ribbon-to-Ribbon (RTR) technology using scanned CO_2 laser beams for producing thin sheets of silicon for low-cost solar cells. Through control of the growth ambient and melt-solid interface shape, ribbons with high purity and very large grain size were obtained. Also, temperature profiles were developed for producing ribbons with no buckling and with low residual stresses. These improvements have led to production of 1 cm x 2 cm solar cells with AM1 conversion efficiencies approaching 13%, with the average being around 11.5%. Electron beams are also being investigated as a possible heat source in the RTR process.

31430 **The effects of metallurgical grade silicon additions on the electrical and structural characteristics of polysilicon solar cells.** Johnson, S.M. (Solarex Corp., Rockville, MD); Storti, G.M.; Armstrong, R.W. pp 949-953 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The effects of MG silicon additions on the electrical and structural characteristics of polysilicon material were investigated by casting polysilicon ingots, using a mixture of high purity SG silicon with up to ten percent MG silicon, and fabricating solar cells using this material. As the percentage of MG silicon increases, solar cell efficiencies were degraded by low short-circuit current, due primarily to a reduction in the intragrain diffusion length and secondarily to grain boundary recombination, and reduced open-circuit voltages and fill factors due to a domination of the dark I-V characteristics by space-charge recombination. X-ray topographs are presented which show that the increase in MG silicon incorporated into the ingots is accompanied by a degradation in the crystal microstructure, which is known to decrease cell efficiencies.

31431 **Characterization of HEM silicon for solar cells.** Dumas, K.A. (California Inst. of Tech., Jet Propulsion Lab. Pasadena); Khattak, C.P. pp 954-958 of Conference Record, Photovoltic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The Heat Exchanger Method (HEM) is a promising low-cost ingot casting process for material used for solar cells. This is the only method that is capable of casting single crystal ingots with a square cross section using a directional solidification technique. This paper describes the chemical, mechanical and electrical properties of the HEM silicon material as a function of position within the ingot.

31432 Apparatus and technique for pulsed electron beam annealing for solar cell production. Landis, G.A.; Armini, A.J.; Greenwald, A.C.; Kiesling, R.A. (Spire Corp., Bedford, MA). pp 976-980 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Many of the demands of high-throughput processing of solar cells can be satisfied by transient methods using pulsed electron beams. A prototype pulsed electron beam processor for solar cell production has been built, and is intended for automated annealing of solar cell junction ion implantation at a rate of 1200-1800 silicon wafers per hour. Other applications include solar cell junctions by pulse diffusion, annealing of ion-implanted back surface fields, and pulse sintering of cell metallization.

31433 Characteristics of photovoltaic devices manufactured by unanalyzed, low energy, high current ion implantation process. Sirkis, M.D. (Arizona State Univ., Tempe); Saltzman, D.L. pp 981-984 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A silicon solar cell has been produced using a large area unanalyzed high-current ion beam to form junctions by implantation. Mass analysis elimination leads to greatly simplified implantation equipment, and experiments were carried out to investigate the feasibility of using an unanalyzed beam. Ion beam components were implanted into wafers in proportion to their relative spectra intensities, and results supported feasibility, but trace impurities must be considered. To increase beam current, the large cross-section beam is used. Implanting is performed, and the result after metallization is a cell with a fill factor of 0.77 and an efficiency of 14%.

31434 By-pass diode design, application and reliability studies for solar cell arrays. Giuliano, M.; Starley, D.; Warfield, D.; Schuyler, T. (Solarex Corp., Rockville, MD). pp 997-1000 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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A planar-diffused structure is described for use as an unencapsulated by-pass or shunt diode in solar cell arrays. Design features result in reliable performance, low fabrication cost and ease of handling during assembly. Special consideration is given to heat dissipation related to the manner in which the diodes are mounted in the array. Operating life-test curves are presented which indicate excellent stability for continuous current levels as high as 8 amperes at a panel temperature of 60 C. Forward voltage drop for these diodes is less than 800 mV at 2.5 amperes and the reverse current is in the order of microamperes at 7 volts.

31435 Pulsed electron beam applied to silicon solar cells. Michel, J. (Lab. d'Electronique et de Physique Appliquee, Limeil-Brevannes, Val-de-Marne, France); Barbier, D. pp 1007-1010 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Silicon solar cells have been made with the junction formed by phosphorous implantation followed by a short pulse of low energy electrons. The thermal effects associated with the pulse are described. The effect of beam fluence on cell characteristics has been studied. It is found that the junction is as good as those made by classical diffusion. This leads to overall conversion efficiencies up to 12 percent which are higher than those of laser annealed cells and close to those of diffused solar cells.

31436 Economics of ingot slicing with an internal diameter saw for low-cost solar cells. Daud, T. (California Inst. of Tech., Jet Propulsion Lab., Pasadena); Liu, J.K. pp 1011-1015 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Slicing of silicon ingots using diamond impregnated internal diameter blade saws has been a standard technology of the semiconductor industry. This paper describes work on improvements to this technology for 10 cm diameter ingot slicing. Ingot rotation, dynamic blade edge control with feedback, mechanized blade dressing and development of thinner blades are the approaches tried. A comparison of the results for wafering with and without ingot rotation is also made. A sensitivity analysis of the major cost elements in wafering is performed for 10 cm diameter ingot and extended to the 15 cm diameter ingot case. Various parameter values such as machine cost, feed rate and consumable materials cost are identified both for single and multiple ingot slicing.

31437 Laser scanning of ungridded solar cell material. Lasswell, P.G.; Plunkett, B.C. (Univ. of Delaware, Newark). pp 1021-1024 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A technique using laser scanning of solar cells under reverse bias is described, and its utility in detecting defects in ungridded Cu(x)S/CdS solar cell material is demonstrated. Examination of ungridded cells has been used to detect localized shorting and inactive areas as part of a cell development program.

31438 Structure and phase studies in Cu(x)S/Cds heterostructure by X-ray diffraction. Roy, P.K.; Luszuz, S.J. (SES, Inc., Newark, DE). pp 1025-1029 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electonics Engineers, Inc. (1981). (CONF-810526—).

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Direct observation of chalcocite and djurleite (Cu 1.935) phases in the p-Cu(x)S layer along with structural and lattice information of the n-CdS layer has been made in Cu(x)S/CdS thin film heterostructure by X-ray diffraction (XRD). The method, being non-destructive, has the advantage of obtaining this information at all stages of the solar cell fabrication. Furthermore, the effects of process perturbations on device performance due to the structural properties of the cell can be systematically studied.

31439 CdS/Cu_2S solar cells by the chemical spray deposition-ion exchange process. Maruska, H.P.; Young, A.R. II; Wronski, C.R. (Exxon Advanced Energy Systems Lab., Linden, NJ). pp 1030-1034 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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A novel process has been developed for the fabrication of thin films of CdS. As the initial step, films of CdO which are 1-3 microns thick are deposited by spray pyrolysis of a cadmium salt onto substrates of SnO_2-coated glass. These films are then subjected to an ion exchange procedure in a flowing sulfide ambient at temperatures of 400-500 C. The films are completely converted into CdS. The CdS films, now 2-6 microns thick, have grain sizes of 1-3 microns. The material exhibits green photoluminescence, and the collection efficiency of carriers generated in the CdS approaches 80%. Problems have been encountered in the fabrication of high quality CdS/Cu_2S heterojunction solar cells due to the inability to form good junctions. The photocurrents were seriously limited by recombination in the junction, and respectible values were only achieved under conditions of reverse bias.

31440 Cu_xS/CdS solar cells prepared by organometallic chemical vapor deposition Preliminary stage. Hwang, H.L. (National Tsinghua Univ., Hsinchu, Republic of China); Ho, J.S.; Ou, H.J. pp 1035-1040 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Techniques for growing Cu_xS layers on heterojunction solar cells by CVD processes are reported, and steps in the growth process are described. The copper source was a $(CuCl(NCCH_3))n$ vapor, and the sulfur source was H_2S gas. CdS films were sprayed on glass substrates and sliced into 300 microns thick (001) wafers. The Cu2S layer was grown over a wide range of feed temperatures and gas compositions in a reactor at 600-900 C. Atomic absorption, neutron activation analysis, energy dispersive X-ray analysis, Rutherford backscattering, and X-ray diffraction were emploted to observe the growth mechanisms. The film growth rate was determined to increase with substrate temperature, becoming significant at over 800 C. The data verified the presence of Cu and S in the deposited films.

31441 Epitaxial thin film GaAs solar cells using OM-CVD techniques. Stirn, R.J.; Wang, K.L.; Yeh, Y.C.M. (California Inst. of Tech., Pasadena). pp 1045-1050 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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A new approach has been initiated to fabricate thin-film, high efficiency GaAs solar cells on low-cost, single-crystal Si substrates having a thin CVD interlayer of Ge to minimize the lattice and thermal expansion mismatch. For initial experiments, n(+)/p GaAs cells were grown by OM-CVD on single-crystal GaAs and Ge wafers. Details of the growths and performance results will be presented. Subsequently, a combined epitaxial structure of OM-CVD GaAs on a strongly adherent Ge interlayer on (100) Si was grown. This is the first report of the successful growth of this composite structure. Low module costs projected by JPL SAMICS methodology calculations and the potential for 400-600W/kg space solar arrays will be discussed.

31442 GaAs shallow-homojunction solar cells on epitaxial Ge grown on Si substrates. Gale, R.P.; Tsaur, B.Y.; Fan, J.C.C.; Davis, F.M.; Turner, G.W. (MIT, Lexington, MA). pp 1051-1055 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Solar cells with conversion efficiencies of 12% (AM1) have been fabricated from single-crystal GaAs epilayers grown by CVD on Ge-coated Si substrates. The cells utilize an n(+)p/p(+) shallow-homojunction GaAs structure on a thin (less than 0.2 micron) epitaxial Ge layer. The Ge layer provides a surface on which CVD GaAs can readily nucleate, and the GaAs/Ge interface acts as a barrier to propagation of dislocations from the Ge. Solar cells made in this material exhibit short-circuit current densities over 24 mA/sq cm. These solar cells are the first reported GaAs devices fabricated on Si substrates.

31443 Thin film heterojunction solar cells based on n-CdS and p-Cu ternary alloys of the type $CuInyGa(1-y)Se_2xTe_{2(1-x)}$. Loferski, J.J. (Brown Univ., Providence, RI); Kwietniak, M. pp 1056-1061 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

31444 Fabrication of CdTe solar cells by hot wall vacuum evaporation. Huber, W. (Univ. of Linz, Austria); Lopez-Otero, A. pp 1062-1067 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Layers of n-CdTe that had been doped with In during deposition were grown on monocrystalline BaF_2 and on bulk crystal CdTe substrates using the Hot Wall Vacuum Evaporation method. Mobilities of up to 590 sq cm/Vsec and carrier concentrations of up to 10 to the 17th/cu cm were measured at room temperature. Diode reverse saturation currents from 10 to the -10th to 10 to the -9th A/sq cm, a hole diffusion length of 1.2 microns, and an open-circuit voltage of 0.62 were measured under simulated AMI.5 sunlight for unoptimized n/p-homojunctions, n-CdTe:In films on large grain (1-2 mm) crystalline p-CdTe:P. In addition, a model was developed for the spectral dependence of the quantum efficiency.

31445 Spray pyrolysis prepared CdTe solar cells. Serreze, H.B.; Lis, S.; Squillante, M.R.; Turcotte, R.; Talbot, M.; Entine, G. (Radiation Monitoring Devices, Inc., Watertown, MA). pp 1068-1072 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Achievement of all thin-film, CdTe-based heterojunction solar cells has been successfully demonstrated using a potentially very low cost chemical spray process. Open-circuit voltages over 600 mV and conversion efficiency up to 4% have been obtained. The active semiconductor layers are extremely thin, and preliminary investigations of wider bandgap windows, alternative acceptor dopants for the CdTe, and cell stability have shown very encouraging results.

31446 Characterization of the CdSe thin film solar cell. Rickus, E.; Bonnet, D. (Battelle Inst., Frankfurt-am-Main, West Germany). pp 1073-1076 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The conditions of preparation as well as investigations of the spectral response and the work function of the contact metal on CdSe-MIS-solar cells are reported and discussed. Using simple antireflection coatings cells 2-3 microns thick and 1 sq cm in size show efficiencies of 5 percent. Increasing the cell area poses no fundamental problems. Individual values of Isc, Uoc and fill factor indicate potential efficiencies of around 10 percent. Technological steps towards this goal are proposed.

31447 Materials for tandem solar cells. Stankiewicz, J.; Giriat, W. (Inst. Venezolano de Investigaciones Cientificas, Caracas, Venezuela). pp 1087-1090 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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In this paper the ternary mixed alloys HgTe-CdTe and MnTe-CdTe are proposed as candidates for producing tandem solar cells. This system fulfills basical requirements: both mixed compounds crystallize in a zinc-blende structure and have direct band gaps: the energy gap changes continuously from 0.0 to 2.5 eV and the lattice constant varies less than 1.6% in the whole range of compositions. HgTe-CdTe alloys were studied quite extensively. The preparation and the optical and electrical properties of single crystals of MnTe-CdTe will be discussed. A linear variation of the energy gap in the whole range of composition (up to 70% of Mn) is observed. The photoresponse is in good agreement with the energy gap obtained from electroreflectance. By proper treatment the concentration of the holes can be changed in a wide range.

31448 Effects of shading and defects in solar cell arrays - A simple approach. Gupta, A.; Milnes, A.G. (Carnegie-Mellon Univ., Pittsburgh, PA). pp 1111-1116 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Tradeoffs involved in solar cell array arrangements are discussed with the aid of examples and simple numerical calculations. The effect of various shading conditions on different arrays is studied, along with the arrays' tolerance of the effects of open or short-circuit cells. The effects of cell failure and the benefits of providing interconnections between series strings in a module spanned by a bypass diode are considered. It is found that bypass diodes are desirable both for reasons of shading and the possible presence of defects. Power losses caused by partial shading depend on the orientation of the shading relative to the line of the bypass diodes. Open circuit defects or spot shading cause loss of the current in the string, while numerous branch circuits reduces the voltage loss caused by short-circuit cells. Interconnections within a module are not likely to be beneficial in arrays where there may be a large number of bypass diodes.

31449 Solar cells failure modes under reverse voltages and reliability. Ricaud, A.M.; Forge, F.; Sarre, P.E. (France-Photon, Angouleme, Charente). pp 1117-1121 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Improved reverse power dissipation capabilities in photovoltaic installations are presented. The primary technique involves connecting a bypass diode in parallel to short-circuit the string, once the voltage becomes negative. With a predetermined reverse voltage of 20 V at 60 C, a 36 cell module can be protected by one diode. It is shown that the effects of direct power loss are negligible when compared with advantages in reverse operations. A coupling optimization system was tested for efficiency in using the proposed protective devices, and the 6300 W, 220 V system can offer a limited power loss, a possible decoupling per branch allowing continual function of the system, and a reduction of the number of bypass diodes. Further investigation of the decoupling optimization may lead to more reliable photovoltaic systems.

31450 Optical absorption measurements of pure and heavily doped silicon from 1.24 to 4.63 eV and the effect on solar cell performance. Jellison, G.E. Jr.; Modine, F.A.; White, C.W.; Young, R.T. (Oak Ridge National Lab., TN). pp 1164-1169 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—). Contract W-7405-ENG-26.

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

31451 Cathodoluminescence analysis of polycrystalline GaAs. Salerno, J.P.; Gale, R.P.; Fan, J.C.C. (MIT, Lexington, MA). pp 1174-1178 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Cathodoluminescence analysis has been used for nondestructive characterization of the optoelectronic properties of Zn-doped, polycrystalline GaAs. In scanning cathodoluminescence micrographs, grain boundaries can either show no contrast, appear as dark lines, or appear slightly brighter than the surrounding matrix. Spectral analysis has been used for measurements of carrier concentration and diffusion length with a spatial resolution on the order of 1 micron. The results of these measurements indicate that many of the observed grain boundary features are due to local variations in impurity concentration.

31452 Grain boundaries in silicon as analogs of surfaces. Redfield, D. (RCA Labs., Princeton, NJ). pp 1179-1182 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—). Contract AC01-79ET23108.

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The electrical behavior of grain boundaries in silicon is investigated. Results of studies using several polycrystalline Si materials show that the potential barriers at grain boundaries are nearly negligible before annealing but grow markedly at 900-1000 C. In addition, it is found that the crystalline orientations have little to do with the existence of barriers, the chemical condition of the boundaries dominates their electronic behavior, the boundaries are quite free of impurities before heating, and annealing creates barriers by causing dissolved oxygen to segregate at boundaries. It is concluded that the electronic properties of these boundaries are very much like those of surfaces. N.B

31453 Surface recombination velocity measurement for silicon solar cells. Daud, T.; Cheng, L.J. (California Inst. of Tech., Pasadena). pp 1183-1188 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

For the design and fabrication of silicon solar cells approaching theoretical ultimate conversion efficiencies, surface recombination velocity plays a crucial role. A technique using a scanning electron microscope with pulsed electron beam has been developed for the measurement of this important parameter for silicon surfaces. It is shown that the surface recombination velocity(s) increases by an order of magnitude when a freshly etched sample is left out for a few hours, presumably due to generation of surface states. A textured front surface field (FSF) cell with a high-low junction near the surface shows the effect of minority carrier reflection and an apparent reduction of s, whereas a tandem junction (TJ) cell with n+-p junction near the surface gives larger s value.

31454 Automated measurement system for solar cell optical characterization studies of GaAs and multijunction cascade cells. Cape, J.A.; Oliver, J.R.; Miller, D.L.; Paul, M.D. (Rockwell International Microelectronics Research and Development Center, Thousand Oaks, CA). pp 1195-1198 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A computer controlled facility has been developed which provides complete optical characterization of solar cells from the UV to the near IR. The apparatus measures directly the absolute spectral photoresponse, near normal incident reflectivity and/or optical transmissivity. Using these data, the computer extracts such parameters as minority carrier diffusion lengths and calculates AM1, AM0, etc. efficiencies using stored spectral information. The instrument also has a built-in capability for measurement of optically and/or electrically biased multijunction (e.g., stacked cell) devices.

31455 Measurement of minority carrier diffusion length in cuprous oxide. Trivich, D.; Rakhshani, A.E.; Bazzi, A. (Wayne State Univ., Detroit, MI). pp 1199-1201 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—). Contract AC02-79ET23010.

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Electron diffusion lengths, Ln, in Cu_2O Schottky barrier cells were measured by relating the photocurrent, In, to the depletion width, W, under various reverse biases, V(R). The values of Ln were obtained as intercepts at In 0 of linear plots of In vs. W, using a wavelength of 600 nm. The values of Ln were 0.1 microns

for Cu/Cu_2O junctions with various doped samples of Cu_2O. Capacitance measurements were used to determine the dielectric constant and W. Plots of 1/Cd squared vs. V(R), which were linear, were used to obtain the built-in potential, yielding values of 0.1 to 0.45 V.

31456 **Thin-film polycrystalline silicon solar cells - Progress and problems.** Surek, T.; Ariotedjo, A.P.; Cheek, G.C.; Hardy, R.W.; Milstein, J.B.; Tsuo, Y.S. (Solar Energy Research Inst., Golden, CO). pp 1251-1260 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Thin-film polycrystalline silicon solar cells offer a potential low-cost alternative to single crystal silicon. This paper reviews the progress in polycrystalline silicon solar cell research in areas of thin-film material and cell development, and in the basic understanding of the effects of grain boundaries and the passivation of these effects. Current concerns in this area include the scalability of the more promising approaches, the reliability and stability of the cells and modules, and an assessment of the low-cost potential of the technologies. Recent progress in addressing these important problem areas is described.

31457 **Zinc phosphide thin film solar cells.** Bhushan, M.; Catalano, A. (Univ. of Delaware, Newark). pp 1261-1264 of Conference Record, Photovaltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Results and analysis of large area (1 sq cm) Schottky devices on thin polycrystalline films of p-type zinc phosphide, Zn3P2, are reported. The films were grown on metallized mica and silicon steel substrates. Measured values of short-circuit current, when corrected for estimated 30% optical losses, range from 11.4 to 25.7 mA/sq cm. The diode parameters, reverse saturation current, diode factor and open-circuit voltage compare well with the Schottky diodes on single crystal Zn3P2. A maximum total area conversion efficiency of 2.7% on a 1 sq cm cell is reported. Grain-boundaries are shown to have no deleterious effects on current collection or open circuit voltage.

31458 **Single crystal growth and electrical properties of Zn_3P_2.** Wang, F.C.; Fahrenbruch, A.L.; Bube, R.H. (Stanford Univ., CA). pp 1265-1270 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The electrical properties of zinc phosphide (Zn_3P_2) are investigated using Hall and resistivity measurements vs temperature, and a technique for growing large single crystals of Zn_3P_2 by using an iodine chemical transport agent is presented. Typical growth rates for single crystals, grown by using a closed-tube horizontal vapor transport system, are 0.45 mm/hr for sublimation and 0.65 mm/hr for iodine transport. The acceptor levels of sublimation-grown crystals are found to have ionization energies of less than or equal to 0.02, 0.25, and 0.47 eV, while for iodine-transported crystals the values are 0.068 and 0.14 eV. The average 300 K Hall mobility and hole density are determined to be 12 sq cm/V-sec and 10 to the 16th/cu cm, while the hole density can be increased to 5 x 10 to the 17th/cu cm by thermal diffusion of Ag into Zn_3P_2.

31459 **Cadmium telluride films for photovoltaic devices.** Chu, T.L.; Chu, S.S.; Pauleau, Y.; Stokes, E.D.; Jiang, C.L.; Murthy, K.; Abderrassoul, R. (Southern Methodist Univ., Dallas, TX). pp 1271-1276 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The microstructure and crystallographic properties of thin films of cadmium telluride that have been deposited on ceramic and coated graphite substrates by the direct combination of cadmium and tellurium in a hydrogen atmosphere are studied by means of SEM and X-ray techniques. In addition, the electrical properties of these films are evaluated from the current-voltage characteristics of Schottky barriers. Results show that the deposition rate, the composition of the film, and the incorporation of dopants depend strongly on the Cd/Te molar ratio in the reactant mixture. Nearly stoichiometric films are found to have a carrier mobility of 20-30 sq cm/V-sec and an effective intragrain minority carrier diffusion length of 1-1.8 microns. Short-circuit current densities of up to 15 mA/sq cm and open-circuit voltages of up to 350 mV have been obtained under AM1 conditions for devices of 9 sq cm in area. However, the conversion efficiencies of these devices are found to be limited by the high series resistance associated with the high CdTe/substrate interface resistance and high resistivity of cadmium telluride films.

31460 **A brief summary of research at Tsing Hua on $CuInS_2$ - A new photovoltaic material.** Hwang, H.L. (National Tsinghua Univ., Hsinchu, Republic of China); Yang, M.H.; Chen, C.R. pp 1277-1282 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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A new photovoltaic material, $CuInS_2$, has been investigated. Mainly due to its direct band gap of 1.5eV, $CuInS_2$ promises to offer high conversion efficiency as a solar cell. Single crystals were grown by chemical vapor transport, theoretical calculations and experiments were carried out in order to determine the optimum growth conditions, and similar calculations were done for heterojunction epitaxial layers. Because the properties of $CuInS_2$ were not well known, doping and annealing effects were studied, and methods to determine the $CuInS_2$ composition and impurity contents were developed. Fabrication of low cost arrays was attempted in two ways: by thin film employing both r.f. sputtering and flash evaporation methods, and and by tandem cells of very high efficiency coupled with concentrators. The possibility of heterojunction epitaxial growth by chemical vapor transport, chemical vapor deposition, and liquid phase epitaxy was examined. The structural and electrical properties, and current conduction mechanisms were studied.

31461 **Processing-induced defects in Al(x)Ga(1-x)As p-n junction solar cells fabricated by the LPE, MOCVD, and the MBE growth techniques.** Li, S.S. (Univ. of Florida, Gainesville). pp 1283-1288 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Studies of the grown-in deep-level defects in the Al(x)Ga(1-x)As p-n junction solar cells fabricated by the LPE, MOCVD, and the MBE techniques have been made using DLTS, C-V, and I-V measurements. It is shown that Al(x)Ga(1-x)As epitaxial layers grown by the LPE method has yielded the lowest defect density among the samples prepared by the three different growth techniques studied, while Al(x)Ga1-x)As epitaxial layer grown by the MBE technique has shown the highest defect density. The main electron and hole traps observed in the undoped n-type Al(.3)Ga(.7)As epitaxial layers grown by the LPE and the MOCVD methods are given by the E(c) - 0.31 eV and E(v) + 0.18 eV level, respectively. The defect spectra in the MBE epilayer showed continuous trap levels with defect density several orders of magnitude higher than those of LPE samples. A 300 C thermal annealing for two and five hours on the LPE samples showed significant reduction in both the defect density and the recombination current in the Be-diffused Al(.3)Ga(.7)As p-n junction diodes.

31462 **AlGaAsSb/GaAsSb cascade solar cells.** Timmons, M.L.; Bedair, S.M. (Research Triangle Inst., Research Triangle Park, NC). pp 1289-1293 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electrioncs Engineers, Inc. (1981). (CONF-810526—).

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Monolithic cascade solar cells have been grown in the Al-Ga-As-Sb material system using 1.2 eV GaAsSb low bandgap cells and 1.8 eV AlGaAsSb tunnel junctions and high bandgap cells. This is the optimum bandgap combination for 450 K operation. Efficiencies have been low, 1 to 2 percent, on non-optimized structures which had neither window layers nor AR coatings. The best Voc values have been about 1.1 V (1 sun, AM0) and 1.35 V at 30 suns, AM0. Substantial improvements in the Jsc for both component cells grown individually with diffused junctions have been obtained recently, reaching a maximum Jsc about 20 mA/sq cm (1 sun, AM0) measured for a 1.2 eV GaAsSb cell. Electrical and spectral response characteristics of these diffused-junction cells are presented along with those of cascade cells grown using abrupt junctions.

31463 **ITO-Silicon nitride-silicon tunneling solar cells under concentrated light illumination.** Myszkowski, A.; Sansores, L.E.; Tague A-Martinez, J. (Universidad, Nacional Autonoma de Mexico, Villa Obregon). pp 1294-1301 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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A general theory of the tunneling solar cells (MIS and SIS structures) is presented. This new theory is valid even at strong illumination when free carriers are stored near to the semiconductor surface and the quasi-Fermi level drops appreciably across the insulator layer. Some numerical calculations of the conversion efficiency at high light concentration is done for the ITO-SiO(x)-pSi and ITO-Si_3N_4-pSi structures. The latter structure, having lower tunneling barrier and higher electron tunneling probability, performs far better than the former (eta approximately 24 percent in the 200-300 suns region). The influence of several material parameters on the conversion efficiency is discussed.

31464 **MIS cell behavior in hydrogen passivated polycrystalline silicon.** Temofonte, T.A.; Szedon, J.R.; Biter, W.J. (Westinghouse Research and Development Center, Pittsburgh, PA). pp 1304-1309 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Low temperature MIS barrier processing and structurally correlated slices of polycrystalline silicon were used to obtain direct, unambiguous evidence of grain boundary photocurrent behavior for several specific treatments. Short hydrogen plasma treatments (300 C, 1 hr) of polysilicon with thermal oxide barriers, subsequently metallized, were successful in eliminating grain boundary photocurrent suppression, as revealed by laser spot photoresponse. Heat treatments in nitrogen at 900 C significantly intensified grain boundary photocurrent suppression. Auger analysis reveals that a thick compositionally complex surface layer is produced by hydrogenation.

31465 **Thin film gallium arsenide solar cells with reduced film thickness.** Chu, S.S.; Chu, T.L.; Jiang, C.L.; Loh, C.W.; Stokes, E.D.; Yu, J.M. (Southern Methodist Univ., Dallas, TX). pp 1310-1315 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—). Contract AC02-77CH00178.

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MOS solar cells have been fabricated from gallium arsenide films of 10 microns thickness deposited on tungsten coated graphite substrates. The deposition of gallium arsenide films was carried out by the reaction between gallium, hydrogen chloride, and arsine in a hydrogen flow system. Gallium arsenide films of about 10 microns thickness exhibited pronounced shunting effects due to grain boundaries. Effective passivation of grain boundaries is necessary to produce large area solar cells with good conversion efficiencies. MOS solar cells of 9/sq cm area with an AM1 efficiency of up to 8.5% have been prepared reproducibly from gallium arsenide films treated with ruthenium ion and thermal oxidation.

31466 **Effects of grain boundary passivation in polycrystalline solar cells.** Janssens, R.; Mertens, R.; Van Overstraeten, R. (Leuven, Katholieke Univ., Louvain, Belgium). pp 1322-1325 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A new technique for passivating grain boundaries in polycrystalline material has been developed: sintering of an Al-SiO_2-Si structure. Solar cells made with this additional sintering step show average improvements of 5-10 mV in open circuit voltage and 1.0-1.5 mA/sq cm in short circuit current. After the procedure used to get the test results, qualitative results on solar cells made of two different materials are proposed. Next, various parameters influencing this passivation are discussed. Finally, some theoretical analysis is performed to explain the test results.

31467 **Polycrystal X-ray topography and the photoresponse of grains or grain boundaries in polysilicon.** Rosemeier, R.G. (Univ. of Maryland, College Park); Armstrong, R.W.; Johnson, S.M. pp 1331-1336 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

X-ray topographs and optical photoresponse measurements have been matched on a point-by-point basis across the surface of polysilicon solar cells to show the dependence of the photovoltaic properties on grain perfection and on the particular boundary structure between adjacent grains. Dislocations, subgrain boundaries, twins and inclusions are revealed within the relatively perfect microstructures of cells by the asymmetric crystal topography (ACT) method in surface reflection and by the Lang transmission topography method. The decreased photoresponse at particular grain boundaries is attributed to the smaller crystal dislocation portion of the larger total change in orientation across the grains.

31468 **A shorting junction for monolithic multicolor solar cells.** Fraas, L.M. (Chevron Research Co., Richmond, CA). pp 1353-1356 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Multicolor solar cells require shorting junctions interconnecting the light-sensitive junctions. Early two-color cell designs use tunnel junctions fabricated with high band gap materials. This approach leads to very high doping density requirements and stringent constraints on interdiffusion. Herein, it is observed that improved shorting junctions can be fabricated by using a thin low band gap material. If the material is thin enough, it will be transparent. This approach has the advantage of reducing the barrier height for tunneling, thereby reducing the shorting junction resistivity. Germanium is an ideal lattice-matching material, and it can be deposited with CVD.

31469 **Laser bonding for non-lattice matched stacked cells.** Yang, H.T.; Zehr, S.W. (Rockwell International Microelectronics Research and Development Center, Thousand Oaks, CA). pp 1357-1362 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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An alternative to the development of a monolithic multicolor solar converter is to individually fabricate high quality subcells with optimum bandgap materials and subsequently join them together through a metallurgical bonding procedure in such a way that the needed transparent intercell ohmic contacts are produced. This approach avoids the lattice matching requirements throughout the structure. The feasibility of using a pulsed Nd:glass laser to accomplish such bonding through local heating of semiconductor materials at the bond interface is currently being explored. Pairs of GaAs and GaSb wafers have been successfully bonded in this way. The bonded interface has been found to be electrically conducting and optically transparent. The first GaAs/Al.2Ga.8Sb bonded cascade cell has been demonstrated.

31470 **V-groove faceted reflector for enhanced module output.** Amick, J.A. (Exxon Research and Engineering Co., Linden, NJ); Kurth, W.T. pp 1376-1381 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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In the manufacture of present-day photovoltaic modules, single crystal wafers of silicon serve as the starting point. Because of the high cost of the silicon, it is not economical to convert the circular wafers into square or rectangular cells, even though these cells would more nearly fill the available area in a module. Accordingly, a substantial portion, typically 20 to 25%, of the module area is not filled with silicon. Incident light falling on these 'interstitial' regions between cells is largely lost, leading to module inefficiencies. One technique for recovering a portion of the 'lost' light is to use a white, scattering background behind the cells. The cell output can generally be improved by 5 to 10%. The present study is concerned with an improved method of recovering the light falling on the interstitial regions by which nearly 50% increase in cell output has been realized in favorable cases. The method makes use of an optically transparent medium above the cells, and a series of V-groove facets provided in the interstitial regions between cells.

31471 **Reliability and maintainability considerations of connector system for photovoltaic modules.** Sotolongo, T. (AMP, Inc., Largo, FL). pp 1382-1385 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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Solar cells, usually 4 in. in diameter, are assembled into modules or panels, usually composed of 36 or 48 cells, which are in turn combined into arrays. Once the modules are assembled into arrays, they must be connected electrically to each other. A description is provided of a connector which electrically combines individual modules into arrays and protects the connections themselves against the elements of nature. The strong, rigid material used, the versatility and ease of handling of the rubber seals which provide environmental protection for the electrical contact, the quick releasing mechanism used make the considered connector a logical choice when protection from environmental hazards and longevity are needed.

31472 **The MINP solar cell - A new high voltage, high efficiency silicon solar cell.** Green, M.A.; Blakers, A.W.; Willison, Z.R.; Szpitalak, T.; Keller, E.M.; Gauja, E.; Hart, P.J. (Univ. of New South Wales, Kensington, Australia). pp 1405-1408 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A high voltage, high efficiency silicon solar cell has been designed, combining the better features of MIS and P-N junction cells. The MINP is basically a shallow P-N cell with an MIS contact made to the top of the cell. MINP performance advantages as compared to P-N junction cells are due to the low effective recombination velocity at the silicon surface under the MIS contact, allowing open circuit voltages of up to 678 mV. The high voltage results in improved efficiency, and for the 2 cm x 2 cm cell test structure, 16% total area efficiencies have been measured. High voltage cells also offer a decreased sensitivity to increasing temperature. In addition, the MINP device is well suited for ion implantation as electron concentration near the surface is more controllable, and ion implantation is a vacuum process, the preferred technique for the top contact in MINP cells.

31473 **Induced back surface field and MISIM solar cells on pSi substrates.** Tarr, N.G. (Univ. of British Columbia, Vancouver, Canada); Pulfrey, D.L. pp 1409-1411 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

This paper describes the use of Pt-SiO(x) MIS contacts to form negative barrier, minority carrier reflecting junctions to p-type silicon. It is shown that solar cells utilizing these junctions as back contacts can yield open-circuit voltages comparable to those obtained in cells fabricated on identical substrates, but furnished with diffused junction back surface fields. This effect has been observed in solar cells which have either a diffused front junction (N(+)PIM cells) or a min MIS front junction (MISIM cells). The negative barrier contact has also been found to increase the infrared photocurrent response.

31474 **On the stability of SnO_2/n-Si and ITO/n-Si solar cells.** Maruska, H.P.; Feng, T.; Ghosh, A.K.; Eustace, D.J. (Exxon Advanced Energy Systems Lab., Linden, NJ). pp 1412-1417 of Conference Record, Photovoltaic Specialists Conferance, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The stability of heterojunction semiconductor-insulator-semiconductor solar cells is analyzed in order to examine the changes in the photovoltaic parameters that can be correlated with the redistributions of charges at the interface. Results show that there are two distinct mechanisms for degradation, one optical and the other thermal, in SnO_2/n-Si and indium tin oxide/n-Si solar cells, while no changes in performance are found if the cells are kept at room temperatures in darkness. The dark current-voltage characteristics are changed by the thermal and optical processes in which light stress increases the dark saturation current and heat stress decreases the diode quality factor, while the open circuit voltage decreases in either case. The optical degradation mechanism is found not to cause changes in the photocurrent, but this current is decreased by the thermal process. It is concluded that the thermal degradation process is due to alterations in the thickness and composition of the silicon oxide interphase region, while the optical process is associated with a change in the energy distribution of the surface states of the Si/SiO(x) interface.

31475 **Electrostatic and other effects in inversion layer MIS solar cells.** Green, M.A.; Szpitalak, T.; Willison, M.R.; Blakers, A.W.; Lam, Y.W. (Univ. of New South Wales, Kensington, Australia). pp 1418-1421 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Stability studies of high performance inversion layer silicon MIS solar cells show that short term variations in the inversion layer charge can occur due to changing electrostatic conditions associated with the antireflection coating. This paper describes experiments aimed at clarifying the mechanisms involved. Although cells of reasonable efficiency have been made with relatively coarse grid spacings (12/cm), it is concluded that much finer spacings are required to ensure cell stability. A second part of this study is concerned with the physical structure, chemistry, and stability of the MIS contact itself, which is of fundamental interest not only in inversion layer MIS cells, but also in transparent metal MIS cells, MINP cells and other MIS-based devices.

31476 **p-InP photocathodes, solar to hydrogen conversion and improvement of polycrystalline films by reacting silver with the grain boundaries.** Heller, A.; Vadimsky, R.G.; Johnston, W.D. Jr.; Strege, K.E.; Leamy, H.J.; Miller, B. (Bell Telephone Labs. Inc., Murray Hill, NJ). pp 1422-1427 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

31477 **Effects of oxygen impurities upon solar cell performance.** Legge, R.N.; Sakiotis, N.G. (Motorola, Inc., Phoenix, AZ). pp 1428-1431 of Conference Record, Photovoltaic Specislists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The effect of oxygen on resistivity, minority carrier diffusion length, and P-N junction I-V characteristics as it affects solar cell performance is the subject of this paper. It is shown that interstitial oxygen can be thermally activated into a donor state by either the act of crystal growth itself or by the temperatures that a sample experiences during processing. These excess donors affect the resistivity by changing the majority carrier concentration and, more importantly, the minority carrier lifetime is reduced. A procedure to reverse this effect is also presented. Finally, excess current in the dark I-V characteristics of p-n junctions formed on various substrates is shown to be associated with the presence of oxygen.

31478 **Combination photovoltaic/thermal solar collectors for residential applications.** Younger, P.R. (Spire Corp., Bedford, MA); Kreisman, W.S. pp 959-963 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institue of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

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The design, development and fabrication of combination photovoltaic/thermal (PV/T) solar collectors for residential applications is reported. Liquid and air cooled, flat-plate collectors were designed in which close packed silicon solar cells absorbed the bulk of the solar radiation to provide both thermal and electrical energy. Air cooled collector cells had front and back open grid metallization to allow infrared radiation to pass through to a separate highly absorbing surface. Liquid cooled collector cells had solid back metallization optimized for infrared absorption. Details of the optical, electrical, thermal and mechanical characteristics of these collectors are presented.

31479 **Defect design of insulation systems for photovoltaic modules.** Mon, G.R. (California Inst. of Tech., Pasadena). pp 964-971 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A defect-design approach to sizing electrical insulation systems for terrestrial photovoltaic modules is presented. It consists of gathering voltage-breakdown statistics on various thicknesses of candidate insulation films where, for a designated voltage, module failure probabilities for enumerated thickness and number-of-layer film combinations are calculated. Cost analysis then selects the most economical insulation system. A manufacturing yield problem is solved to exemplify the technique. Results for unaged Mylar suggest using fewer layers of thicker films. Defect design incorporates effects of flaws in optimal insulation system selection, and obviates choosing a tolerable failure rate, since the optimization process accomplishes that. Exposure to weathering and voltage stress reduces the voltage-withstanding capability of module insulation films. Defect design, applied to aged polyester films, promises to yield reliable, cost-optimal insulation systems.

31480 **Design, fabrication and performance of high efficiency photovoltaic modules.** Nowlan, M.J.; Kreisman, W.S.; Younger, P.R. (Spire Corp., Bedford, MA). pp 972-975 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Design details and performance and environmental test results of newly developed high performance and reliability photovoltaic modules are presented. Efficiencies averaging 14.3% for 3040 cells were obtained by using ion implantation for cell junction and back surface field formation. 152 rectangular (6.0 cm x 4.6 cm) cells arranged with a 97% local packing density comprise the circuit assembly, and cells are wired 4 in parallel by 38 in series. The top cover of the superstrate design module is composed of tempered low-iron glass to provide transparent protection for the optical surface. Results show that this design has an encapsulation system which does not fail in the event of reverse-bias operation, and an average module efficiency of 12.2% was achieved at a 58.6W power which varied only 2% among all 20 modules.

31481 **Combined photovoltaic/thermal collector panels of improved design.** Russell, T.; Beall, J.; Loferski, J.J.; Roessler, B.; Dobbins, R.; Shewchun, J.; Krikorian, J.; Case, C.; Doodlesack, G.; Oates, W. (Brown Univ., Providence, RI). pp 990-996 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—). Contract AC03-79CS30205.

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The paper describes the design and performance of 'second generation' combined photovoltaic/thermal collectors utilizing air as the heat transfer fluid intended for use in residential systems. The absorptance of the solar cells used in these PV/T panels was improved by blackening the ohmic contacts and using textured cells covered with AR-coatings. Heat transfer from the cells to the air stream was improved by bonding metal fins to the rear surface of the cells or by narrowing the air flow channel to about 0.25 in. Computer modeling of the improved design indicates that eta vs Delta T curves are substantially improved over first generation PV/T panel performance curves. A panel of this type was constructed and the results of its performance tests compare favorably to the analytical predictions.

31482 **Field failure mechanisms for photovoltaic modules.** Dumas, L.N.; Shumka, A. (California Inst. of Tech., Pasadena). pp 1091-1098 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Beginning in 1976, Department of Energy field centers have installed and monitored a number of field tests and application experiments using current state-of-the-art photovoltaic modules. On-site observations of module physical and electrical degradation, together with in-depth laboratory analysis of failed modules, permits an overall assessment of the nature and causes of early field failures. Data on failure rates are presented, and key failure mechanisms are analyzed with respect to origin, effect, and prospects for correction. It is concluded that all failure modes identified to date are avoidable or controllable through sound design and production practices.

31483 **Photovoltaic module hot spot durability design and test methods.** Arnett, J.C.; Gonzalez, C.C. (California Inst. of Tech., Pasadena). pp 1099-1105 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The susceptibility of fat-plate modules to hot-spot problems is investigated. Hot-spot problems arise in modules when the cells

become back-biased and operate in the negative-voltage quadrant, as a result of short-circuit current mismatch, cell cracking or shadowing. The details of a qualification test for determining the capability of modules of surviving field hot-spot problems and typical results of this test are presented. In addition, recommended circuit-design techniques for improving the module and array reliability with respect to hot-spot problems are presented.

31484 **The application of fracture mechanics to failure analysis of photovoltaic solar modules.** Chen, C.P.; Leipold, M.H. (California Inst. of Tech., Pasadena). pp 1122-1125 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Cracking of silicon solar cells and solar module transparent cover panels such as glass or polymethylmethacrylate (PMMA) is a major cause of photovoltaic solar module failure in field service. Silicon and cover materials are brittle, and cracking of these materials is expected to result from the extension of preexisting flaws under stress. Study of the cracking mechanisms is therefore an appropriate area for the application of fracture mechanics principles. In this study, fracture mechanics techniques were employed to identify the mode of crack propagation, to examine the fracture-initiating flaw, to estimate the nature and magnitude of fracture stress in the field, and to predict analytically the service lifetime. Recommendations for corrective actions are also made.

31485 **The solar cell laser scanner.** Miller, E.L.; Chern, S.S.; Shumka, A. (California Inst. of Tech., Pasadena). pp 1126-1133 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Failure analyses have been performed on over 300 photovoltaic modules from thirty different manufacturers and five countries. Because of the volume of work and the variety of module types encountered, it has been necessary to develop non-destructive techniques to rapidly locate the failure sites. This paper will present design details and results obtained with one instrument developed specifically for this purpose, the Solar Cell Laser Scanner (SCLS). The effects of applying a bias current to the modules will also be discussed, based upon experimental observations and computer generated predictions.

31486 **Detection of a defective cell in a solar module through photoresponse modulation.** Maire, J.; Theys, B.; Baruch, P. (Univ. of Paris VII, France). pp 1134-1138 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A method to detect a solar cell with an abnormally low short-circuit current is developed in which a small, modulated, probing light beam superimposed to the main solar illumination is directed on a single cell and the output ac signal is measured at the module terminals. A high impedence will result from a cell that is reverse biased, and the cell's photocurrent will not be shunted by the cell impedence and will flow through the other cells, yielding a modulated signal which can be detected at the module terminals which are connected to an adequately chosen load resistance. Since a normal cell would yield a much lower signal, the magnitude of this signal can then be used as an indicator for reverse biased cells, because of the low photocurrent. An advantage of this method is that it does not require physical access to the cells.

31487 **Apparatus and method for solar coal gasification.** Gregg, D.W. (to Dept. of Energy). US Patent 4,229,184. 21 Oct 1980. Filed date 13 Apr 1979. vp.

PAT-APPL-029962.

Apparatus for using focused solar radiation to gasify coal and other carbonaceous materials. Incident solar radiation is focused from an array of heliostats onto a tower-mounted secondary mirror which redirects the focused solar radiation down through a window onto the surface of a vertically-moving bed of coal, or a fluidized bed of coal, contained within a gasification reactor. The reactor is designed to minimize contact between the window and solids in the reactor. Steam introduced into the gasification reactor reacts with the heated coal to produce gas consisting mainly of carbon monoxide and hydrogen, commonly called "synthesis gas", which can be converted to methane, methanol, gasoline, and other useful products. One of the novel features of the invention is the generation of process steam at the rear surface of the secondary mirror.

1406 Photovoltaic Power Systems

REFER ALSO TO CITATION(S) 31391, 31400

31488 **(CONF-830454—2) Simulation of solar subdivision addresses utility questions about integration of solar photovoltaics.** Jewell, W.T. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 19p. NTIS, PC A02/MF A01. Order Number DE83012094.

From Southeastcon '83 IEEE Region 3 conference; Orlando, FL, USA (10 Apr 1983).

The feasibility of a proposed 100-house subdivision in which each house will have a solar photovoltaic (PV) generation system to supply part of its electric power is examined from the standpoint of the electric utility to which the systems will be connected. Problems of harmonic distortion and reactive power consumption caused by the line commutated inverters that convert the PV cells' dc output to ac are investigated. Experimental study of a demonstration home was done and the results of this study were used in a computer simulation of the entire subdivision. The computer simulation indicated that this particular subdivision should be acceptable to the utility as proposed. However, changes may be needed in the utility's capacitor switching practices, because the capacitors on the distribution feeder can significantly amplify the harmonic distortion produced by the inverters. While the numerical results of this study apply only to the proposed subdivision, there are general results applicable to many situations where harmonic sources are present on a distribution system.

31489 **(DOE/ET/20279—234) Design and fabrication of a prototype system for photovoltaic residences in the Southwest. ARTU final report.** Sorenson, D.; McNamara, R. (Applied Research and Technology of Utah, Orem (USA)). Oct 1982. Contract AC02-76ET20279. 78p. NTIS, PC A05/MF A01. Order Number DE83012044.

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This is the final report for the Applied Research and Technology of Utah, Inc. (ARTU) Prototype System as established at the Southwest Residential Experiment Station (SW RES). The SW RES is operated by the New Mexico Solar Energy Institute (NMSEI) at Mexico State University in Las Cruces, New Mexico. It is intended that the SW RES be utilized to gather and disseminate data about the design, construction, and performance of photovoltaic electric power-generating systems for residential application when; connected to the utility grid. This report presents the ARTU solar residence design and details the design of the photovoltaic (PV) prototype System. Section 1 discusses the residence design and includes drawings of the residence and its energy audit. Section 2 describes the Prototype System from the aspects of structural, mechanical, and electrical design. Details are presented regarding the as-built conditions of the prototype, roof-loading considerations, the unique cooling system, a description of the PV modules, the module mounting method, the DC-to-AC inverter, and other power-conditioning equipment. Section 3 includes lessons learned during the project, costs incurred to complete the Prototype, and recommendations for different procedures for the next design. Section 4 presents a summary of the system operating and maintenance procedures.

31490 (DOE/ET/20279—239) Carlisle photovoltaic house: first seventeen months. Preliminary report. Nichols, B.E. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). Feb 1983. Contract AC02-76ET20279. 88p. NTIS, PC A05/MF A01. Order Number DE83011569.

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The solar photovoltaic power system at the Carlisle House (Carlisle, MA) has been in successful operation for seventeen months. Completed in May 1981, the house was not occupied until March 1982 so it was lived in only during six of the seventeen months covered by this report. Energy production from the array was as predicted but the heating loads in winter were much larger than expected due to a change in the heating system, to minor faults and incomplete construction, and to the fact that the house was unoccupied and therefore not energy-managed. Although there has been automated data collection since April 1981, monthly summaries of all measured parameters are not yet available. Results presented here have been obtained mostly from mechanical kWh meter readings and from the data system daily summaries. Performance summaries for the operating systems and results of special tests also are included.

31491 (DOE/NASA/20485—14) Analysis of the economics of photovoltaic-diesel-battery energy systems for remote applications. Brainard, W.A. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1983. Contract AI01-76ET20485. 8p. (NASA-TM—83377; CONF-830622—5). NTIS, PC A02/MF A01. Order Number DE83011288.

From American Solar Energy Society meeting; Minneapolis, MN, USA (1 Jun 1983).

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Computer simulations were conducted to analyze the performance and operating cost of a photovoltaic energy source combined with a diesel generator system and battery storage. The simulations were based on the load demand profiles used for the design of an all photovoltaic energy system installed in the remote Papago Indian Village of Schuchuli, Arizona. Twenty year simulations were run using solar insolation data from Phoenix SOLMET tapes. Total energy produced, energy consumed, operation and maintenance costs were calculated. The life cycle and levelized energy costs were determined for a variety of system configurations (i.e., varying amounts of photovoltaic array and battery storage). The system configuration producing the minimum levelized energy cost was determined. Results are presented for three sets of economic assumptions and for two different photovoltaic module efficiencies representative of standard and high density (high frame efficiency) modules. Effects of reducing photovoltaic module costs on the levelized energy cost results are examined. Implications of the study on the design of power system for remote applications are discussed.

31492 (DOE/SF/11597—T1) Photovoltaic applications for remote-island needs. Schaller, D.A. (Black Hawk Associates, Denver, CO (USA)). Jan 1983. Contract AC03-82SF11597. 202p. NTIS, PC A10/MF A01. Order Number DE83008112.

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Electric power supply options available to many of the central and south Pacific island governments are severely constrained by remoteness, limited infrastructures, a corrosive natural environment, and the high delivered costs of many conventional energy sources. Photovoltaic energy systems offer a currently available, practical, and cost-effective source of electricity for many standalone applications in remote areas of the Pacific. Photovoltaic system definitions and cost analyses are provided for selected applications in the Republic of Palau, the Federated States of Micronesia, the Republic of the Marshall Islands, and the Territory of American Samoa.

31493 (EUR—8161-DE) Assembly and testing of experimental installation with solar cells and concentration collectors. Pfeiffer, H. (Maschinenfabrik Augsburg-Nuernberg (M.A.N.) A.G., Muenchen (Germany, F.R.)). 1982. 130p. (In German). Commission of the European Communities, 2100 M St., NW, Suite 707, Washington, DC 20037.

A description is given of the development of a concentrator system for solar cells consisting of 1 or 4 parabolic grooves with a concentration factor of from 29 to 40. The cooling agent mechanism as well as hybrid systems utilizing electrical energy with the aid of an absorption-cooling process for sea water desalination are also described. 3 references, 69 figures.

31494 (SAND—82-2239) Energy production trade-offs in photovoltaic system design. Jones, G.J. (Sandia National Labs., Albuquerque, NM (USA)). Apr 1983. Contract AC04-76DP00789. 10p. NTIS, PC A02/MF A01. Order Number DE83011468.

The energy per unit area produced annually by a photovoltaic system is a function of collector efficiency and incident solar radiation. The incident energy is determined by geographic location and type of mounting structure: fixed or tracking. Because of significant differences in the solar energy available to various structure and tracking concepts, it is possible to achieve equal energy cost for widely varying array field prices. Our analysis (using recent estimates for balance-of-system costs) of several array options shows that two-axis tracking of flat-panel collectors results in lower energy cost than do fixed arrays, even at low module prices. We also show that concentrating collector modules and flat-plate modules achieve the same energy cost at similar cost per square meter.

31495 Mismatch between batteries and two module types P.V. arrays. Interest of D.C.-D.C. converters. Gucher, P.; Roger, J.A.; Massaad, S.; Posbic, J.; Pivot, J. (Lyon-1 Univ., Villeurbanne (France). Dept. de Physique des Materiaux). pp 330-334 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

The study of mismatch effects between P.V. arrays and batteries is described. Due to the modifications of the experimental conditions (depending on the batteries state of charge, the external temperature and light flux), it is not possible to extract at each time the maximum available power from a P.V. array. Similar problems result from the parallel use in the same array of different modules, mismatch effects being enhenced by the fact that different encapsulation lead to different équilibrium for the junctions. The relative power losses in both cases have been analyzed on a small system made of two kinds of modules. Extrapolation to high power P.V. arrays has been done and a D.C.-D.C. converter for 5 kW P.V. arrays is presented. The interest of converters in the case of large generators coupled to batteries is discussed and some applications are proposed.

31496 Calculation to improve power conversion efficiency in photovoltaic systems. Mas, A.; Garcia, J.; Closas, L.; Insausti, M.; Castaner, L. (Escuela Tecnica Superior de Ingenieros Industriales, Barcelona (Spain)). pp 340-344 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

Several photovoltaic system configurations in order to improve the adaptation between a photovoltaic panel and an AC load, in low power applications are dealt with. Panel to battery and battery to AC load interfaces are considered and their efficiencies evaluated for each configuration. Several values of the system main parameters as battery voltages, nominal output power and others are also considered. Experimental results indicated that the panel to

battery interface efficiency is substantially improved by inserting an adaptative battery interface (ABI). The behavior of the battery to load interface for the configurations proposed is analised.

31497 **Inverters for PV plants feeding the electrical network of small isolated communities.** Arcidiacono, V.; Taschini, A. (ENEL, Milan (Italy). Direzione Studi e Ricerche). pp 258-267 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

The main circuit schemes and the working principles of the self-commutated inverters are reviewed. The factors that have to be taken into account in choosing the type of inverter for PV plants feeding the electrical networks of small isolated communities are examined.

31498 **A support structure for intermediate PV solar plant.** Albergamo, V. (ENEA, Rome (Italy). Ist. Casaccia); Borlenghi, P.L.; Cheli, F.; Diana, G.; Falco, M. pp 270-274 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

A new concept of support structure for intermediate PV plant is described. The structure is realized with parallel wire-ropes, anchored to the ground and supported by A-type poles. Flat plate PV row of panels are suspended between parallel ropes. This concept of structure offers numerous advantages: modularity, extremely high PV field packing factor, lightness, easiness of trucking and mounting in remote regions, easiness of maintenance and cable routing, very low ground levelling and foundation work. On the other hand, as a result of aerodynamic forces due to wind acting on the PV panels, instability phenomena may occur, as structure flutter and buffeting. Therefore theoretical and experimental analysis are necessary and are now in progress. First results are shown.

31499 **The photovoltaic solar system, analysis and basic design rules.** Kipperman, A.H.M. (Technische Hogeschool Eindhoven (Netherlands)). pp 280-285 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

The basic structure of a photovoltaic system includes as a feed-back the state of charge of the battery and as a feed-forward signal the consumption pattern of the user, the time of the day, the season and the actual insolation. This knowledge is necessary to assure the coverage of user's basic energy needs. The system design is based on the minimum array area to cover the yearly basic needs and the minimum storage based on the probable number of consecutive days with low insolation in a critical supply period. Between these two boundaries the system can be optimized in terms of cost. As an example the same consumption of 1KWh/day is used to calculate the optimum system for Den Helder (NL) and for Trapani (I) resulting in a clear minimum in cost for the latter. In the summer period is energy available above the basic need for comfort of the user; the average price in Trapani is $2/KWh and in Den Helder $4.5/KWh.

31500 **A detailed package of digital codes specially developed for the array design.** Bullo, P. (ENEL, Milan (Italy). Direzione Studi e Richerche); Gasbarra, M.; Emanuele, G. pp 286-290 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

A complete modular set of digital codes is described, specially developed for a sensitivity analysis of the different technical parameters affecting the design and construction of a photovoltaic generating unit, in particular of a large-scale type. The scope is the evaluation of the plant energy deficit on an hourly, daily and monthly basis, in respect of a base-care where optimum values of the panel tilt angles, azimuth and the N-S step between rows are chosen. Assuming a lower ceiling in the B.O.S. cost of the photovoltaic power station, based on a foreseeable reduction of the panel costs, an indication is given of the region of tilt and azimuth loci which makes it possible to accept a moderate annual energy deficit and consequently low cost of the photovoltaic energy produced by the generating unit.

31501 **Analysis of hot-spot-effects in encapsulated photovoltaic generators by laser scan and partial shadowing.** Hewig, G.H.; Huebner, H.P. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Physikalische Elektronik). pp 291-295 of Fourth E.C. Photovoltaic solar energy conference. Proceedings of the international conference, held at Stresa, Italy, 10-14 May 1982. Bloss, W.H.; Grassi, G. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). (CONF-820555—).

From 4. phootovoltaic solar energy conference; Stresa, Italy (10 May 1982).

The connection of several solar cells in a generator implicates some problems unknown to a single solar cell. Due to variations in the short circuit current of the different solar cells, caused either by partial shadowing or variations during the production process, some cells may act as a load, thus resulting in hot-spot-effects. The operating condition of a solar cell in a photovoltaic generator, with the single cells connected either in series or parallel, is analysed. To investigate encapsulated modules the methods of laser scan and partial shadowing are employed. The combination of both methods yields the short circuit current and the reverse IV-characteristic of each solar cell, which both are important to classify the different cells according to the possible appearance of hot-spots. Hot-spot-effects in Si-solar cell generators are quite possible due to their high shunt resistance, thus withstanding quite high reverse voltages, which may result in a high power consumption of that solar cell, if their short circuit current is lower than the average current of the generator. The possibility of the appearance of hot-spots in a Cu_xS-CdS solar cell generator is much lower due to fact that thin film solar cells in general show a breakthrough in their reverse characteristic at much lower reverse voltages.

31502 **System design and reliability considerations for an intermediate-size photovoltaic power system for a remote application.** Noel, G.T.; Stember, L.H.; Carmichael, D.C. (Battelle Columbus Labs., Columbus, OH). pp 725-731 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

The design of a photovoltaic power system for remote applications is described. The preliminary requirements placed on the system are high reliability of power and low life-cycle cost, considering equipment, remote installation, and operation and maintenance costs. The design incorporates flat-panel modules assembled onto steel frames and prewired prior to shipment to the site, in order to minimize on-site installation costs, skilled labor requirements, and risk of costly delays and failures. Other components include power conditioning units, battery storage, battery charger, back-up diesel generators, and controls. A methodology for system reliability analysis using the fault-tree technique is illustrated to aid in system design, and an assessment is made of mean time between failures (MTBF), mean time to restore/repair (MTTR), and system availability.

31503 Analysis of merits of hybrid wind/photovoltaic concept for stand-alone systems. Castle, J.A.; Kallis, J.M.; Moite, S.M.; Marshall, N.A. (Hughes Aircraft Co., Los Angeles, CA). pp 738-744 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Methods for evaluating the merits of hybrid wind/photovoltaic systems for use in stand-alone applications were developed. The optimum mix of wind and photovoltaic power with an electrochemical storage system, with or without fossil fuel generator backup, depends upon the individual subsystem economics. A computer code was developed to calculate the optimum subsystem sizes that minimize the levelized energy cost. The actual merits of a hybrid system over a pure photovoltaic or wind system depend upon many factors: load profile; wind regime; insolation; cost and availability of backup power; the relative costs of wind rotor area, array area, and storage; and subsystem efficiency factors. Examples of optimized hybrid systems for a range of photovoltaic costs and estimated wind and storage costs are shown for an Ely, NV, application, where backup power is allowed to supply 5% of the total annual load.

31504 The protection of photovoltaic power systems from lightning. Rogers, C.B. (Sandia National Lab., Albuquerque, NM). pp 761-766 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Lightning protection techniques at nine prototype photovoltaic power system sites with outputs from 18-225 kW are described. Noting that protection schemes are devised to fit isokeraunic data for specific sites, grounding is cited as a common feature for all systems. The grounds are, in separate instances, connected to junction boxes, frames of the solar cell panels, lead from the dc center, from the dc negative terminal, from the frames and equipment, at the array turntable, or from the building rebar frames. The dc power cables are protected by either metal conduit, metal conduit ground wire, direct burial, by rigid metal conduit, ground conductors, or by ground conductors at the ends of the conduit run. Costs run from 0.01-0.28$/W, with all the systems outfitted with bypass and blocking diodes. Direct stroke protection is viewed as less important than isokeraunic data.

31505 Simulation and simplified design of photovoltaic power systems. Evans, D.L.; Facinelli, W.A.; Koehler, L.P. (Arizona State Univ., Tempe). pp 845-850 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Results of TRNSYS simulations of photovoltaic systems with and without battery storage are described. The systems have south facing, flat arrays that are max-power tracked and have one day or less of storage. Studies of the sensitivity of system performance, in terms of the fraction of the electrical load supplied by the solar energy system, to variables such as array size, battery size, location, time of year, and load shape are reported. A simplified method for calculating system performance is described and examples of its accuracy are presented.

31506 Parametric analysis of stand-alone residential photovoltaic systems and the SOLSTOR simulation model. Caskey, D.L.; Aronson, E.A.; Murphy, K.D. (Sandia National Lab., Albuquerque, NM). pp 851-854 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Grid-connected residential photovoltaic (PV) systems have been studied in great detail during the past few years. However, stand-alone systems have received considerably less attention. This paper describes the results of an evaluation of the economic feasibility of stand-alone systems. The SOLSTOR simulation program, developed by Sandia, was the primary analysis tool. The results indicate that stand-alone PV systems offer considerable economic advantage over the fossil-fueled generator systems. This is true even with no escalation of fuel prices, with PV array costs of twice the 1986 DOE goal, with present day battery costs, and in the Northeast as well as in the Southwest part of the United States. The onsite generator was generally used less than 1400 hours per year, and in fact can be eliminated in many cases in the Southwest.

31507 Photovoltaic systems overview. Hesse, J.L. (California Inst. of Tech., Pasadena). pp 1139-1145 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Selected photovoltaic systems currently under user-environment field test by the U.S. Department of Energy Photovoltaics Program are discussed, and operational results are summarized. There are many systems in the stand-alone sector that are cost effective now. As proven products become available, distributed residential, commercial, institutional and industrial on-site systems should be able to displace significant amounts of centrally-generated electricity throughout most of the United States. Finally, utilities should ultimately be able to augment their generating capacity with larger-scale systems. Field experience and industry interface has led to excellent overall product performance.

31508 Photovoltaic systems reliability analysis. Stember, L.H. (Battelle Columbus Labs., OH). pp 1153-1156 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A study is discussed whose aim is to develop alternative system analysis models which incorporate design, maintenance, cost, and reliability information, and predict both annual maintenance cost and energy production over the life of a photovoltaic power system. For several models, methods of calculating system availability are described, including block diagrams and fault trees, state variables and Markov chains, and simulation. Relationships between the availability and lifecycle energy cost models are graphically shown, and diagrams illustrate the methods.

31509 Photovoltaic module and array reliability. Ross, R.G. Jr. (California Inst. of Tech., Pasadena). pp 1157-1163 of Conference Record, Photovoltaic. Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

Several statistical reliability studies have been conducted in areas of photovoltaic component design covering cell failure, interconnect fatigue, glass breakage and electrical insulation breakdown. This paper integrates the results from these various studies and draws general conclusions relative to optimal reliability features for future modules. The described analysis is based on designing for specified low levels of component failures and then controlling the degrading effects of the failures through the use of fault tolerant circuitry and module replacement. Means of selecting the cost-optimal level of component failures, circuit redundancy, and module replacement are described.

31510 The Delphos project. Albergamo, V. (Comitato Nazionale per l'Energia Nucleare, Rome, Italy); Bullo, P. pp 1208-1213 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A new flat-plate photovoltaic system named Delphos (Demonstration Electric-Photovoltaic System) is being developed for use

in Italian remote villages and islands. The system has a peak power of 1.12 MW, a silicon cell area of 9,770 sq m, and a nominal operating field voltage of 1,000 V. The field arrangement developed for the project consists of panels adjacently arranged on a single plane and supported by a raised structure allowing access from below. As a result, systematic shadowing is avoided, wiring problems are simplified, and annual energy collection is increased (highest at a tilt angle of approximately 35). Delphos will be able to function both in the stand alone mode and in connection with the national utility grid. Finally, the control and data acquisition system is composed of four subsystems: automatic plant management and protection, manual plant management, plant state visualization and alarms, and operation data acquisition.

31511 **Residential PV systems for the Hopi Indian tribe.** Reyes, S. Jr. (U.S. Public Health Service, Albuquerque, NM); Sarles, F.W. pp 1214-1218 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

31512 **A comprehensive analysis of the performance characteristics of the Mount Laguna solar photovoltaic installation.** Shumka, A.; Sollock, S.G. (California Inst. of Tech., Pasadena). pp 1237-1244 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

This paper represents the first comprehensive survey of the Mount Laguna Photovoltaic Installation. The novel techniques used for performing the field tests have been effective in locating and characterizing defective modules. A comparative analysis on the two types of modules used in the array indicates that they have significantly different failure rates, different distributions in degradational space and very different failure modes. A life cycle model is presented to explain a multimodal distribution observed for one module type. A statistical model is constructed and it is shown to be in good agreement with the field data.

31513 **Operating characteristics of photovoltaic power system.** Takeda, Y.; Takigawa, K.; Kaminosono, H. (Central Research Inst. for Electric Power Industry, Komae, Tokyo, Japan). pp 1245-1250 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

An experimental 3 kW photovoltaic power system has been constructed and tested in order to determine the optimum system which can be connected to the present electric power network. The experimental system has a solar cell array officially rated at 3.1 kWp (100 mw/sq cm, 25 C) with an optimum operation voltage of 300 V, a separately-excited inverter with a directed current in three phases of 200 V, and a conversion efficiency rated at 91%. Optimum track control at maximum power is necessary to obtain maximum output due to the diode characteristics of the solar cell. Results of a continuous experimental test of this system from April 1980 to February 1981 show that this system can operate without a negative influence on the electric power network, and the average value of output energy was found to be approximately 7.5 kWh/day. In addition, since the levels of insolation during the time of the test period were exceptionally low, higher output energies can be expected in other years.

31514 **The Southwest Residential Experiment Station - The first year.** Zwibel, H.S.; Schaefer, J.F. (New Mexico Solar Energy Inst., Las Cruces). pp 1370-1375 of Conference Record, Photovoltaic Specialists Conference, 15th. New York, NY; Institute of Electrical and Electronics Engineers, Inc. (1981). (CONF-810526—).

From 15. IEEE photovoltaic specialists conference; Orlando, FL, USA (11 May 1981).

A history and status report on the Southwest Residential Experiment Station (SW RES) aimed at instituting residential applications of prototype residence-like photovoltaic systems is given. The three-acre SW RES site has an average annual insolation of 2375 kwhr/sq m, one of the highest in the United States. The eight prototypes under construction are aimed at suitability for the meteorological, cultural, and economic climates of the southwest, design compatibility with residence design with maintenance for one year after turnkey, and a minimum 100 W preproduction module. Useful information resulting from the program includes the redirection of a 4 kW array reducing costs by a factor of 20, awareness of the interference of Spring winds in handling modules larger than 1 ft x 4 ft, and the fact that white aggregate roofing gravel, south of an optimally tilted array, enhances array performance. In addition, each prototype is instrumented for performance monitoring and is equipped with a residential load simulator capable of dissipating from 0 to 26 kW in 100 watt increments.

1407 Solar Thermal Power Systems

REFER ALSO TO CITATION(S) 31375, 31542, 31922

31515 **(DOE/SF/11645—T1) Suitability of salt-gradient solar ponds for electrical power generation in the US Trust Territory of the Pacific Islands, Guam, and American Samoa.** McCord, T.B.; Bathen, K.H.; Boesgaard, H.; Fanale, F.P.; McCord, C.S.; Scudder, R.J.; Weeks, D.D.; Yuen, J.W.L. (SETS, Inc., Honolulu, HI (USA)). Nov 1982. Contract AC03-82SF11645. 185p. NTIS, PC A09/MF A01. Order Number DE83005225.

Portions are illegible in microfiche products.

The procedures and findings of a study to assess the suitability of salt-gradient solar ponds for base-load (firm) electricity generation in the US Trust Territory of the Pacific Islands (TTPI), Guam and American Samoa are described. The general conclusion is that solar pond power plants (SPPPs) are viable both technically and economically for some applications, possibly including atolls. The most practical immediate application would be to small and intermediate power users such as villages and airports. It is recommended that (1) at least one small SPPP be built immediately on a dry land site such as for the main village on Peleliu, Palau, (considered in this report) or at other identified feasible sites, and (2) that a design study be conducted to adapt the technology to atoll sites. This study was carried out by first reviewing all available literature on solar ponds and the regions concerned. All the regions in question were visited. Several sites were selected for specific study and SPPP conceptual designs were developed for these sites. These sites are (1) North Peleliu, Palau, with (2) Peleliu airport as an auxiliary site, (3) Aimeliik, Palau, and (4) atoll environments. Cultural, political, environmental and legal considerations were given equal weight with technical and economic factors, and locally resident persons were used as interpreters and liaisons. There exists strong support in the government and the community to develop these proposed site-specific SPPPs and land is available. Power needs were defined, construction and operation costs were calculated and performance was predicted for the site-specific designs. The results of the Palau site-specific studies were generalized to other areas and environments in the TTPI, Guam and American Samoa. An economic analysis of the SPPP conceptual design developed for Palau was made using the discounted cash flow method.

31516 **(EPRI-AP—2852) Large gas-turbine modifications for solar-fossil hybrid operation. Final report.** Kuo, S.C. (United Technologies Research Center, East Hartford, CT (USA)). Mar 1983. 146p. NTIS, PC A07/MF A01. Order Number DE83901925.

The objectives of the work presented in this report were: to evaluate the technical feasibility of adapting existing and next-generation gas turbines to provide the power-conversion system (PSC) for integration with an air-cooled central receiver in a solar-fossil hybrid powerplant, and then to estimate the development efforts required to implement this adaptation. The evaluations and estimates are presented for four candidate gas-turbine models selected by screening the available gas turbines with nominal ratings between 10 and 100 MWe for their representation of existing and future

power-plant turbomachinery, and on their potential to cost-effectively provide the required PCS capabilities. The concept of adapting large-scale gas turbines for solar-fossil hybrid power plants was found to be attractive in terms of offering many alternative approaches because of the diversity of available turbomachines, and therefore the concept could provide the potential to expedite the development of the Brayton-cycle-powered solar-central-receiver concept for solar-thermal power generation.

1408 Ocean Thermal Gradient And Salinity Gradient Power Systems

31517 (CONF-830622—2) Study of small scale solar pond/OTEC (SPOTEC) power systems. Hillis, D.; Sather, N.; Panchal, C.; Stevens, H.; Hull, J.; Thomas, A. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83010712.

From American Solar Energy Society meeting; Minneapolis, MN, USA (1 Jun 1983).

The technological and economical advantages to be gained by taking advantage of both the solar pond (SP) and ocean thermal energy conversion (OTEC) concepts are discussed. The proposed SPOTEC concept uses a solar pond as a heat source instead of warm surface seawater, and deep ocean water for the heat rejection in the operation of a Rankine-Cycle system. SPOTEC has several advantages over either SP or OTEC considered separately, and there are specific locations in the world where SPOTEC appears attractive, provided the technological problems can be resolved in a cost effective way.

1409 Solar Thermal Utilization

REFER ALSO TO CITATION(S) 31493, 31540, 31546, 31550, 31560, 31561, 31914

31518 (CONF-8109203—, pp vp) Utilization of latent energies by energy roofs, fronts, fences and piles. Naaf, V. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

A survey is given of the various constructions of heat absorbers serving as heat sources for heat pumps in space heating. The applications and limits of the individual systems are demonstrated.

31519 (DOE/CS/30378—1) Passive and hybrid solar manufactured housing and buildings, phase I. Final report. (Northern Homes of Pennsylvania, Inc., Chambersburg (USA)). 28 Feb 1981. Contract FC02-80CS30378. 180p. NTIS MF A01. Order Number DE83006821.

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Three basic designs of passive solar homes were developed, varying in both size and style. Attention was focused on three energy conservation priorities: (1) insulation, (2) orientation, and (3) solar heating. The Castleneck home design, an adaptation of a standard Northern Home manufactured home model, was chosen as the final design. The stages of its development and the comprehensive energy calculations are reported. Annual performance prediction calculations and detailed daily thermal network simulations of selected significant days throughout the year were made for four different locations: Baltimore, Maryland; Philadelphia, Pennsylvania; Hartford, Connecticut; and Burlington, Vermont. Design drawings are presented in an addendum.

31520 (DOE/CS/30574—T5) Advanced solar heating and cooling system design and development (404) program. Final report. Aasen, R.K. (Honeywell, Inc., Roseville, MN (USA). Technology Strategy Center). Mar 1983. Contract AC03-81CS30574. 341p. NTIS, PC A15/MF A01. Order Number DE83008966.

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The program objectives were to design and develop solar heating and cooling systems with high performance, low cost, modular application and marketability. As the prime contractor responsible for the solar system design, Honeywell teamed with Barber-Nichols of Denver, Colorado, and Lennox Industries of Dallas, Texas, and provided the full range of system and subsystem design, fabrication, installation, maintenance, and evaluation. Solar energy systems delivered were: residential heating (two), residential heating and Rankine-cycle air conditioner (R/C-A/C), cooling (four), multifamily/light commercial heating and R/C-A/C cooling (two), and commercial R/C-A/C cooling (two). Additionally, a 16-KVA R/C power generation module and a high-efficiency, high-temperature R/C-A/C power generation module were delivered. Other major accomplishments included: full qualification of the Lennox collector to the Interim Performance Criteria; development of a residential energy transport module; development of a high-performance, low-cost heat exchanger; development of a low-cost collector support structure and headers; definition and testing of several R/C-A/C improvements; analysis of R/C power generation; and study of advanced R/C-A/C cooling. All systems have performed well, amassing more than 30 years of total operational time. The preliminary evaluation results of the operational history and data indicate: (1) spece-heating systems are technically state of the art; (2) R/C-A/C cooling systems perform as designed, but appear unattractive from an energy/cost standpoint; and (3) advanced research and development in R/C-A/C systems (hardware, configuration and controls) is essential.

31521 (EUR—7977-EN) Extended abstracts of final reports in the field of solar energy applications to dwellings. Kinsella, E.; Vokaer, D.; Steemers, T.C. (Commission of the European Communities, Luxembourg. Directorate-General for Research, Science and Education). 1982. 120p. Available from Commission of the European Communities, Luxembourg.

'Solar Energy Applications to dwellings', project A, is one of the eight tasks which form together the solar energy R+D programme of the directorate general XII, for science, research and development of the Commission of the European Communities. It includes two types of actions: 1. - The 'Concerted Actions', which are executed with a common programme in different countries, at the same time. These actions are dealing with: a) Modelling of solar heating and domestic hot water systems. b) Validation of these models with data from solar pilot test facilities. c) Performance monitoring of solar houses. d) Collector testing. e) Passive Systems. f) Modelling of passive systems. 2. - Individual research programmes carried out within the frame of contracts with research institutes or private companies, and dealing with solar heat storage and solar cooling mainly. The present document contains the 24 extended abstracts of the final reports of the research work, as they became available in the last two years.

31522 (EUR—7977-EN, pp 29-33) Feasibility study on a combined summer cooling and winter heating system based on a combination of solar energy and ground heat pumps. Fordsman, M. 1982. Published as microfiche report EUR—6701-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31523 (EUR—7977-EN, pp 79-82) Solar energy applications for dwellings modelling and simulation part. Jorgensen, O. 1982. Available from Commission of the European Communities, Luxembourg.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31524 (EUR—7977-EN, pp 87-90) Development of an autonomous free piston refrigerating unit driven by Rankine cycle. Jaumotte, A.; Bougard, J. 1982. Published as microfiche report EUR—6786-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31525 (EUR—7977-EN, pp 91-95) **Intermittent cycles using solid absorbents for solar cooling.** Meunier, F. 1982. Published as microfiche report EUR—7708-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31526 (EUR—7977-EN, pp 97-101) **Study and evaluation of the latent cooling potential of chemical de-humidifiers.** Campbell, J.; Lush, D.M. 1982. Published as microfiche report EUR—7711-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31527 (EUR—7977-EN, pp 103-108) **Construction of a complete all season conditioning with solar energy of an office building of 260 m² and its operation.** 1982. Published as microfiche report EUR—6702-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31528 (EUR—7977-EN, pp 109-113) **Development of evaporative cooling packing.** Tattersfield, J. 1982. Published as microfiche report EUR—7709-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31529 (EUR—7977-EN, pp 115-120) **Critical appraisal of monitoring procedures in solar heated houses.** Whittaker, C. 1982. Published as microfiche report EUR—7710-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31530 (LA-UR—83-869) **Thermal network reduction.** Balcomb, J.D. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 7p. (CONF-830622—1). NTIS, PC A02/MF A01. Order Number DE83010099.

From American Solar Energy Society meeting; Minneapolis, MN, USA (1 Jun 1983).

A method is presented for reducing the number of elements required in a thermal network representation of a building. The method is based on matching the actual building response at two frequencies, the diurnal response and 3-day response. The procedure provides a straightforward methodology for combining all the various materials inside a discrete building zone into a few nodes while retaining a high degree of accuracy in the dynamic response. An example is given showing a comparison between a large network and the reduced network.

31531 (LBL—15296) **Solar Energy Program, FY 1982 annual report.** Cairns, E.J.; Wahlig, M.A. (Lawrence Berkeley Lab., CA (USA)). Mar 1983. Contract AC03-76SF00098. 34p. NTIS, PC A03/MF A01. Order Number DE83011570.

In FY 1982, LBL's work in passive solar included heat transfer research, systems analysis, and materials studies. In the heat transfer area, two projects were pursued. In the first, experimental and analytic studies of natural convection processes that take place within buildings and between the interior of a building and the environment were performed. In the second project, data from spectral infrared sky measurements were analyzed in order to develop correlations between sky temperature and other environmental parameters. In the area of systems analysis, computer models of convective and other basic heat transfer processes were developed, verified, and incorporated into building energy analysis computer programs. Finally, a new passive research project was initiated near the end of FY 1982. Innovative materials that can replace or supplement conventional glazing materials and provide large reductions in building energy use are being identified. Thermodynamic cycles that have the potential for increasing the efficiency of solar-fired absorption air conditioners by at least a factor of two, compared to the current state-of-the-art, are being studied. An air conditioner based on one of these advanced cycles, the double-effect regenerative absorption cycle, has been designed, fabricated, and installed in a new laboratory test facility. A new materials-oriented research program to explore advanced processes for solar energy utilization was established this year. The three primary elements of this research program are: solar heating and chemistry of small particle suspensions, porous optical materials for insulating glazings, and solar collection and control using diffractive optics.

31532 (SOLAR/0020—83/43) **Availability of solar energy reports from the National Solar Data Program.** (Automation Industries, Inc., Silver Spring, MD (USA). Vitro Labs. Div.). Jan 1983. Contract AC01-79CS30027. 74p. NTIS, PC A04/MF A01. Order Number DE83011084.

The various types of reports published by the National Solar Data Program are discussed, and those reports issued prior to January 15, 1983 are listed. The reports identified include: performance reports, bulletins on special solar topics, environmental data reports, solar project description reports and cost reports, program information reports, comparative reports, and reliability and material assessment reports. (LEW)

1410 Solar Collectors And Concentrators

REFER ALSO TO CITATION(S) 31478, 31481, 31517, 31521, 31523, 32383

31533 (BMFT-FB-T—82-245) **Characteristics of exhaust-air fassades as solar absorbers for saving of heating energy.** Cube, H.L. von; Ludwig, E. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 206p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750238.

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The solar radiation exploited by solar-exhaust-air-windows was measured at a building (16 Floors high) facing all 4 main quarters. Since the windows were not constructed as optimal radiation absorbers the heat gain stood in a range of 3 to 10% of the heat consumption, according to the month. Optimal windows (chiefly clear glass with Venetian blinds) were found by a computer program simulating the process of radiation in an exhaust airwindow. With them heat gains up to 50% are possible. Relation to air flow rate and others were found. The calculated results were proved by measurements. With suitable heating systems in the building (heat transport from south side to north side, heat storage) up to 50% of the annual consumption can be saved, depending from various parameters. An example was calculated.

31534 (DOE/CH/90034—T1) **Exposure testing and evaluation of solar-utilization materials.** Gilligan, J.E. (IIT Research Inst., Chicago, IL (USA)). Apr 1980. Contract AT02-76CH90034. 92p. (COO—0578/034/8). NTIS, PC A05/MF A01. Order Number DE81027311.

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This report discusses studies of material degradation mechanisms and models, development of lifetime prediction models, correlation of outdoor accelerated exposure test results with those of conventional exposures, development of appropriate optical characterization tests and methods, establishment of reasonable criteria for acceptance or rejection of candidate materials, performance of bidirectional optical measurements and analyses of their significance, evaluations of certain individual materials and classes of materials, and general analyses of weather-induced trends in material properties.

31535 (DOE/CH/90034—T1-HandBk.) **Handbook of materials for solar-energy utilization. Low-temperature applications.** Gilligan, J.E.; Brzuskiewicz, J.; Brzuskiewicz, J.E.; Mell, R. (IIT Research Inst., Chicago, IL (USA)). Apr 1980. Contract AT02-76CH90034. 539p. (COO—0578/034/8-HandBk.). NTIS, PC A23/MF A01. Order Number DE81027310.

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Information is given on more than one hundred materials which are being used or have a potential use in Solar Energy Utilization devices. The purpose of this handbook is to provide designers, fabricators, and other users of Solar Utilization (SU) materials with basic material properties information, particularly those which relate to weathering and long-term performance. The handbook presents the optical and mechanical properties of as-received materials and their properties after various periods of outdoor exposure. With the cost, availability, and other product data provided, handbook users may obtain an appreciation for the cost-effectiveness of material candidates. Actual and potential SU materials were exposed to natural weathering at three sites. The materials, the exposure parameters and conditions, the optical and physical tests and other pertinent data are described in detail.

31536 (DOE/CS/33977—T1) **Thermal model of a cylindrically symmetric solar pond. Solar pond studies: Phase III. Sixth semiannual progress report.** Dhingra, K.; Bryant, H.C. (JAYCOR, Del Mar, CA (USA); New Mexico Univ., Albuquerque (USA). Dept. of Physics and Astronomy). 10 Jul 1980. Contract AS04-77CS33977. 43p. NTIS, PC A03/MF A01. Order Number DE83012055.

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A finite-element heat transport program has been modified to model the thermal behavior for a cylindrically symmetric salt-gradient solar pond of the Rabl-Nielsen type. In this model transient phenomena as well as steady-state behavior can be studied. Results are presented for a model of the solar pond at the University of New Mexico and are compared with actual measurements. Time constants are determined from a study of thermal histories after commissioning and after turn off and from annual and daily variations.

31537 (EUR—7977-EN, pp 35-44) **European solar collector testing activities and test methods.** Gillett, W.B. 1982. Published as microfiche report EUR—6815(pt.1) EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31538 (EUR—7977-EN, pp 45-47) **Design, construction and first operation of the Belgian solar pilot test facility.** Dutre, W.L. 1982. Published as microfiche report EUR—7694-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31539 (EUR—7977-EN, pp 49-51) **German solar pilot test facility - design, construction, and first phase of operation.** Hanitsch, R. 1982. Published as microfiche report EUR—7705-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31540 (EUR—7977-EN, pp 53-56) **Irish solar pilot test facility.** Cowan, I.J. 1982. Published as microfiche report EUR—7696-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31541 (EUR—7977-EN, pp 57-59) **Dutch solar pilot test facility.** van Galen, E. 1982. Published as microfiche report EUR—7695-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31542 (EUR—7977-EN, pp 61-64) **High performance collector for small power station.** Speidel, K. 1982. Published as microfiche report EUR—6794-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31543 (EUR—7977-EN, pp 65-69) **Development of a selective surface vacuum collector.** Waal, H. de; Simonis, F. 1982. Published as microfiche report EUR—6800-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31544 (EUR—7977-EN, pp 71-74) **Study and construction of flat plate collector capable of 80 to 150 C.** Dahan, G. 1982. Published as microfiche report EUR—6956-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31545 (EUR—7977-EN, pp 75-77) **Study of the supporting and integration of the Bertin's evacuated TV-tube collector.** Grossin, R. 1982. Available from Commission of the Eruopean Communities, Luxembourg.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31546 (EUR—7977-EN, pp 83-86) **Absorption refrigeration machine driven by solar heat.** Keizer, C. 1982. Published as microfiche report EUR—6748-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwelling.

31547 (Juel-Spez—169) **Heat exchange characteristics of an absorber plate.** Poos, B. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik). Aug 1982. 70p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750669.

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Calorimetric measurements were carried out to investigate the heat exchange characteristics of a liquid-heating absorber plate. In order to provide steady-state ambient conditions, all experiments were carried out indoors. It was possible to reproduce the measured heat flow satisfactorily by means of simulated data. Typical deviations between experimentally determined and calculated heat transfer coefficients amounted to approximately 12%. The heat exchange characteristics in the case of forced convection were investigated using two different methods. In the first, the absorber plate was placed in the free-jet of a ventilator. By means of a suitable procedure the inhomogeneous velocity distribution of the free-jet was averaged to an effective wind velocity. In the second method, the absorber plates were integrated into the inner surface of a duct in which an air stream was produced by the low pressure side of the ventilators. The distribution of the air velocity in the duct was homogeneous and highly reproducible. The results of heat transfer measurements were compatible with calculated values. The heat flow determined using forced convection in a free jet showed sig-

nificant deviations as against theoretical values at increasing inhomogeneity of the air velocity.

31548 (Juel-Spez—184) Heat transfer on an absorber roof regarding meteorological parameters. Massmeyer, K.; Posorski, R. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik). Nov 1982. 158p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750668.

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The useful energy output of absorber plates was measured under the seasonal range of weather conditions over a period of 1 year. The absorber plates were mounted either with thermal insulation on the rear side or elevated from the supporting plane to allow additional heat exchange on the rear side. Calorimetric measurements of the plates at different temperature levels were carried out with simultaneous recording of meteorological data. Comprehensive data were collected in respect of black-painted absorber plates as well as those with selective coating. It has been demonstrated that the stagnation temperature of an absorber plate, which is yielded under no-flow conditions, is a suitable parameter for calculating the useful energy output by simulation. The model describing the thermal performance of absorber plates is based on heat exchanger characteristics and includes the effect of absorption of radiation. The results obtained from the model were verified over the wide range of measured temperature levels.

31549 (NP—3901795) Development of an inexpensive solar collector cum storage system for agricultural requirements. Final report. Garg, H.P. (Indian Inst. of Tech., New Delhi. Centre of Energy Studies). Jan 1983. 227p. NTIS (US Sales Only), MF A01. Order Number DE83901795.

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The effect of various climatic, design, and operating parameters for improving the performance of some fixed-configuration type of conventional and novel type of solar air heaters are examined. Other improvements considered are (i) effect of expanding the heat-transfer area by porous-bed absorber, and (ii) of using selective absorber coatings (i.e. $\epsilon = 0.1$). The results obtained from the theoretical research work for conventional solar air heater and porous-bed solar air heater have been used to construct a flat-plate solar air heater of area 4 square meters and a rock-bed collector with storage system, also of area 4 m^2. The above units have been combined in a series installation, known as augmented characteristics of the augmented integrated rock collector and storage system are also included. Moreover, this newly constructed (AIRS) unit is under thorough experimentation.

31550 (SERI/STR—255-1782) Active-solar-energy-system materials research priorities. Herzenberg, S.A.; Hien, L.K.; Silberglitt, R. (DHR, Inc., Washington, DC (USA)). Jan 1983. Contract AC02-77CH00178. 194p. NTIS, PC A09/MF A01. Order Number DE83011153.

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THis report describes and prioritizes materials research alternatives to improve active solar heating and cooling system cost-effectiveness. Materials research areas analyzed are (polymer) glazings, heat mirrors, (selective) absorber surfaces, absorber adhesives, absorber substrates, fluids, thermal storage materials, and desiccants. Three classes of solar collectors are considered in the cost-effectiveness analysis: medium-temperature flat-plate collectors (operating temperature, 70°C); high-temperature flat-plate collectors (operating temperature, 70 to 120°C); and evacuated tubes (operating temperature 70 to 230°C). We found the highest priority for medium-temperature flat-plate collectors to be research on polymeric materials to improve performance and durability characteristics. For the high-temperature, flat-plate collectors and evacuated tubes, heat mirror and selective absorber research is the highest priority. Research on storage materials, fluids, and desiccants is of relatively low priority for improving cost-effectiveness in all cases. The highest priority materials research areas identified include: optical properties and degradation of transparent conducting oxide heat mirrors and thickness insensitive selective paints; uv and thermal stabilization of polymeric glazing materials; and systems analysis of integrated polymeric collectors.

31551 (UCLA-ENG—8076) Transpired solar air heaters. Volume 1. Investigation of transpired porous-bed solar air heaters. Final report. Galanter, S.A. (California Univ., Los Angeles (USA). School of Engineering and Applied Science). Nov 1980. Contract FG04-77CS34088. 154p. NTIS, PC A08/MF A01. Order Number DE83012054.

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Tests were conducted to determine the thermal performance of a number of transpired porous-bed solar air heaters. Improvements were made to a reference double-glazed transpired solar air heater and the performance experimentally determined. An air heater incorporating two parallel glass-plate honeycombs for air heater incorporating two parallel glass-plate honeycombs for heat-loss control was also tested. The performance of the double-honeycomb collector proved to be superior to the reference solar air heater's due to the increased transmittance of the coverglass assembly. Both collectors exhibited performance greater than any current state-of-the-art collectors. Two steady-state performance models of the reference double-glazed solar air heater were formulated. One (reference model) incorporated the theoretical work of Edwards and Leung to predict the air temperature rise through the porous bed while the other assumed an isothermal bed with a heat-exchanger effectiveness of one. An energy balance was performed at each collector element, and the resultant system of nonlinear equations was solved iteratively to predict the collector's performance. Air recirculation above the porous bed was modeled using the reference formulation. Collector performance was predicted closely using the isothermal bed model. The reference model yielded close prediction using a recirculation rate of 20%.

31552 (UCLA-ENG—8077) Transpired solar air heaters. Volume 2. Experimental and analytical investigations of a glass-tube porous-bed solar air heater. Final report. Scott, J.R. (California Univ., Los Angeles (USA). School of Engineering and Applied Science). Nov 1980. Contract FG04-77CS34088. 185p. NTIS, PC A09/MF A01. Order Number DE83012057.

Thesis.

This study considers the use of Teflon film glazing and a glass tube honeycomb as a means of reducing top cover heat loss in solar air heaters. Performance testing was carried out using an existing transpired porous bed solar air heater. The experimental unit had a square aperture 0.61 m x 0.61 m and was heavily insulated on all sides. The air heater was tested using two glazing arrangements. Outdoor performance testing indicated a loss coefficient of 4.82 W/m^2 C, which was considerably greater than the expected coefficient of 3.9 W/m^2 C obtained from computer modeling. The problem was traced to the presence of a sizable gap (2.0 cm) between the honeycomb and coverglass. Cellular air motion occurring in the gap was thought to be inducing air motion within the honeycomb cells and thereby enhancing top cover heat loss. To determine if this were the case, a Teflon film was laid directly on top of the honeycomb so as to isolate it from any air motion occurring in the gap region. The computer model was revised to account for the additional glazing and the outdoor performance testing redone. A new experimentally determined loss coefficient of 3.92 W/m^2 C showed excellent agreement to the computer predicted value of 3.8 W/m^2 C. In addition to the performance testing, a three-dimensional finite difference conduction model for determining the heat loss through the mainbody insulation of an air heater was developed and validated. Lastly, a method for solving the radiant exchange problem between the porous bed and glazing elements that accounts for the infrared transparent nature of the Teflon glazings is presented.

31553 (UCLA-ENG—8079) Transpired solar air heaters. Volume 4. An investigation of a solar air heater with a selective black thin-channel absorber and multiple Teflon film and glass cover. Final report. Bhandari, P. (California Univ., Los Angeles (USA). School of Engineering and Applied Science). Nov 1980. Contract FG04-77CS34088. 110p. NTIS, PC A06/MF A01. Order Number DE83012052.

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An experimental air heater having a selective black thin-channel absorber and one glass and two Teflon glazings was designed, fabricated, and tested. The performance of the heater

proved to be superior to many current state-of-the-art air heaters. A steady-state performance model was formulated. An energy balance was performed on each element and the resultant set of nonlinear equations was solved iteratively to predict the collector's performance. The maximum discrepancy between the predicted and experimental performance characteristics was less than 2 percentage points. Sensitivity studies were done to study the effect of various design parameters on the collector's performance, and the results of those studies are presented.

31554 **(UCLA-ENG—8080) Transpired solar air heaters. Final summary report, October 1977-October 1980. Volume 5.** Buchberg, H.; Edwards, D.K. (California Univ., Los Angeles (USA). School of Engineering and Applied Science). Nov 1981. Contract FG04-77CS34088. 94p. NTIS, PC A05/MF A01. Order Number DE83012051.

This investigation established and proved the technical merit of two transpired absorber-heat exchanger concepts in combination with different cover systems. The black porous-bed absorber provided a high transfer area per unit volume for effective heat transfer to air but with limited success in reducing the reradiation loss over what is present with an isothermal non-selective black absorber. Selective black flat plate and vee-corrugated absorbers, appropriately slotted to allow air transfer from a supply plenum to an exit plenum, achieved a reduction in reradiation losses and convective heat transfer from the absorber to the cover-glass. An experimental full scale (0.84 m x 1.93 m) slotted, selective black, flat plate solar air heater was designed, constructed and tested to prove the technical merit of the transpired collector deemed to have the best chance of achieving a cost effective commercial prototype.

31555 **Production of crystalline refractory metal oxides containing colloidal metal precipitates and useful as solar-effective absorbers.** Chen, Y.; Narayan, J. (to Dept. of Energy). US Patent 4,376,755. 15 Mar 1983. Filed date 29 Jan 1982. vp.

PAT-APPL-344085.

This invention is a new process for producing refractory crystalline oxides having improved or unusual properties. The process comprises the steps of forming a doped-metal crystal of the oxide; exposing the doped crystal in a bomb to a reducing atmosphere at superatmospheric pressure and a temperature effecting precipitation of the dopant metal in the crystal lattice of the oxide but insufficient to effect net diffusion of the metal out of the lattice; and then cooling the crystal. Preferably, the cooling step is effected by quenching. The process forms colloidal precipitates of the metal in the oxide lattice. The process may be used, for example, to produce thermally stable black mgo crystalline bodies containing magnetic colloidal precipitates consisting of about 99% ni. The nicontaining bodies are solar-selective absorbers, having a roomtemperature absorptivity of about 0.96 over virtually all of the solar-energy spectrum and exhibiting an absorption edge in the region of 2 mu m. The process parameters can be varied to control the average size of the precipitates. The process can produce a black mgo crystalline body containing colloidal ni precipitates, some of which have the face-centered-cubic structure and others of which have the body-centered cubic structure. The products of the process are metal-precipitatecontaining refractory crystalline oxides which have improved or unique optical, mechanical, magnetic, and/or electronic properties.

1420 Heat Storage

REFER ALSO TO CITATION(S) 31517, 31521, 31550

31556 (EUR—7977-EN, pp 1-4) **Development of a thermal storage system based on encapsulated P.C. materials.** van Galen, E. 1982. Available from Commission of the European Communities, Luxembourg.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31557 (EUR—7977-EN, pp 5-7) **Heat storage using latent heat of fusion of a substance adsorbed on a porous material.** Ronc, M. 1982. Published as microfiche report EUR—7703-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31558 (EUR—7977-EN, pp 9-12) **Development of a thermal storage system based on the heat of adsorption in hydroscopic materials.** Verdonschot, J.K.M.; den Ouden, C. 1982. Published as microfiche report EUR—6777-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31559 (EUR—7977-EN, pp 13-16) **Optimization of heat storage systems using silicagels.** Bougard, J. 1982. Published as microfiche report EUR—7647-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31560 (EUR—7977-EN, pp 17-21) **Development of a pebble bed heat storage.** Grossin, R. 1982. Published as microfiche report EUR—7701-EN, available from Office for Official Publications, Luxembourg, B.P. 1003.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

31561 (EUR—7977-EN, pp 23-27) **Theoretical and experimental study of a 250 m^3 water/pebbles storage basin.** Bernard, J. 1982. Available from Commission of the European Communities, Luxembourg.

Published in summary form only.

In Extended abstracts of final reports in the field of solar energy applications to dwellings.

15 GEOTHERMAL ENERGY

1501 Resource Status And Assessment

REFER ALSO TO CITATION(S) 31565, 31568

31562 **(EUR—8241/I-FR) Technical and economic feasibility of low-energy geothermal resources in Europe. Final report.** (Bureau de Recherches Geologiques et Minieres (BRGM), 45 - Orleans (France)). 1982. 291p. (In French). European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

A study is made of the most important Common Market potential geothermal resources between 30°C and 150°C and the feasibility of their utilization. Mathematical models for production costs are formulated, and various computer-programmed costs are estimated.

31563 **(EUR—8241/II-FR) Technical and economic feasibility of low-energy geothermal resources in Europe. Appendices. Final report.** (Bureau de Recherches Geologiques et Minieres (BRGM), 45 - Orleans (France)). 1982. 267p. (In French). European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

Appendices to the indicated study include the hydrogeological characteristics of geothermal resources, identification of drilling and casing programs, weather data relationships to geothermal needs, heat exchangers, heat pumps, heat pump production costs, transport of geothermal water, low-energy geothermal resources in France and Italy, and industrial applications.

31584 **(NP—3901189) Model for explaining the geothermal anomalies of the Rhine graben by deep-strata water flow and its tectonic preconditions and consequences.** Hoffers, B. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Bio- und Geowissenschaften). 24 Jun 1981. 153p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83901189.

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It is suggested that the geothermal anomalies of the Rhine graben have been caused by hydrothermal convection. Mathematical modelling yields a good agreement between the calculated and the measured temperature. The age of the anomalies may be at least 80,000 years, depending on discharge and maximum depth of convection. The hydrothermal convection is made possible by the active shearing along the axis of the Rhine graben which causes continuously open fractures allowing water flow. Displacements, due to thermal expansion of rocks within the geothermal anomaly, are calculated using the Bett-Maysel reciprocal theorem of elasticity theory. The resulting vertical displacements of 6-8 m maximum may not be observable in the field, whereas the horizontal displacements are sufficient to create normal faults with several metres vertical throw, they can be seen to accompany the geothermal anomalies.

1502 Geology And Hydrology Of Geothermal Systems

REFER ALSO TO CITATION(S) 31286, 31568

31565 **(DOE/ET/28461—T2) Wilcox sandstone reservoirs in the deep subsurface along the Texas Gulf Coast: their potential for production of geopressured geothermal energy. Report of Investigations No. 117.** Debout, D.G.; Weise, B.R.; Gregory, A.R.; Edwards, M.B. (Texas Univ., Austin (USA). Bureau of Economic Geology). 1982. Contract AS05-76ET28461. 193p. NTIS, PC A09/MF A01. Order Number DE83011100.

Regional studies of the lower Eocene Wilcox Group in Texas were conducted to assess the potential for producing heat energy and solution methane from geopressured fluids in the deep-subsurface growth-faulted zone. However, in addition to assembling the necessary data for the geopressured geothermal project, this study has provided regional information of significance to exploration for other resources such as lignite, uranium, oil, and gas. Because the focus of this study was on the geopressured section, emphasis was placed on correlating and mapping those sandstones and shales occurring deeper than about 10,000 ft. The Wilcox and Midway Groups comprise the oldest thick sandstone/shale sequence of the Tertiary of the Gulf Coast. The Wilcox crops out in a band 10 to 20 mi wide located 100 to 200 mi inland from the present-day coastline. The Wilcox sandstones and shales in the outcrop and updip shallow subsurface were deposited primarily in fluvial environments; downdip in the deep subsurface, on the other hand, the Wilcox sediments were deposited in large deltaic systems, some of which were reworked into barrier-bar and strandplain systems. Growth faults developed within the deltaic systems, where they prograded basinward beyond the older, stable Lower Cretaceous shelf margin onto the less stable basinal muds. Continued displacement along these faults during burial resulted in: (1) entrapment of pore fluids within isolated sandstone and shale sequences, and (2) buildup of pore pressure greater than hydrostatic pressure and development of geopressure.

31566 **(PB—83-156711) Geology, drill holes and geothermal energy potential of basal Cambrian rock units of the Appalachian basin of New York state. Final report.** Pferd, J.W. (TAL Research and Development, New York (USA)). Jun 1981. 81p. NTIS, PC A05/MF A01.

This report describes the results of a study which gathered, summarized, and evaluated existing information concerning subsurface temperature, porosity, and permeability of Cambrian rock units in New York State, as well as the chemistry and hydrology of their pore waters. Other geological and geophysical data were also examined to obtain the best estimate of the locus and potential of geothermal energy resources, with comparisons made to French and Canadian geothermal systems. The restricted permeability and porosity of New York's Cambrian rocks may be offset by their relatively higher water temperatures and longer production periods, in addition to the potential for optimal system siting with subsurface porosity enhancement. Available data afford cautious optimism with regard to the region's potential for viable low-temperature geothermal energy resources.

31567 **(SAND—81-2202) Representative well models for eight geothermal-resource areas.** Carson, C.C.; Lin, Y.T.; Livesay, B.J. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 129p. NTIS, PC A07/MF A01. Order Number DE83011336.

Representative well models have been constructed for eight major geothermal-resource areas. The models define representative times and costs associated with the individual operations that can be expected during drilling and completion of geothermal wells. The models were made for and have been used to evaluate the impacts of potential new technologies. The nature, construction, and validation of the models are presented.

1503 Geothermal Exploration And Exploration Technology

REFER ALSO TO CITATION(S) 31570, 31802

31568 **(DOE/ET/27007—1) Baltazor KGRA and vicinity, Nevada: geothermal reservoir assessment case study, northern Basin and Range province. Final report, 1 October 1978-31 January 1983.** Wright, T.C. (Earth Power Production Co., Salt Lake City, UT (USA)). 1983. Contract AC08-79ET27007. 68p. NTIS, PC A04/MF A01. Order Number DE83011574.

The Baltazor KGRA and McGee/Painted Hills geothermal prospects are located in northern Humboldt County, Nevada along the northwestern margin of the Basin and Range province. Exploration work other than drilling has included groundwater sampling, a microearthquake study, a geologic literature search and photogeologic mapping, compilation of aeromagnetic and gravity mapping, soil mercury surveying, electrical resistivity and self-potential surveys and detailed hydrothermal alteration mapping. Exploration drilling included 27 shallow temperature gradient holes, four intermediate-depth gradient wells and one 3703-foot deep test, Baltazor 45-14. The deep test penetrated Miocene rhyolite, andesite, basalt and andesitic basalt flows before excessive hold deviation forced an end to drilling and completion as a deep temperature observation well. A temperature survey two weeks after completion obtained a 119.7°C (247.4°F) reading at survey total depth, 1110 m (3640 feet).

1508 Geothermal Power Plants

REFER ALSO TO CITATION(S) 32160

31569 **(EGG-M—23982) Thermal performance of a geofluid direct-contact heat exchanger.** Wiggins, D.J.; Mines, G.L.; Wahl, E. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 21p. (CONF-830301—15). NTIS, PC A02/MF A01. Order Number DE82013233.

From ASME-JSME thermal engineering joint conference; Honolulu, HI, USA (20 Mar 1983).

A sieve-tray direct-contact heat exchanger was used to transfer heat from a 280°F geothermal fluid to the working fluid, isobutane, in the Raft River 60kW prototype plant. A series of experiments were run at different working fluid-to-geofluid flow ratios which produced different boiling conditions. In this paper, the results of these experiments are analyzed on the basis of thermal performance. The flow ratio, the geofluid outlet temperature, the working fluid inlet temperature, the amount of working fluid dissolved or entrained in geofluid, and tray efficiency are varied and preheating temperature profiles are calculated. These are compared with the experimentally obtained temperature profiles and the relative effects of the variables are evaluated. From this, it was determined that the approach temperature difference was on the order of .1° after 17 preheating trays, and the tray efficiencies, which appear to be about the same for all trays, reached ~ 70%. It was also determined that entrainment has a negligible effect on column

thermal performance. The thermal performance of this column compares favorably with a spray-tower direct-contact heat exchanger and a shell-and-tube heat exchanger in terms of overall heat-transfer coefficient. Distributor tray and boiling tray behavior are discussed. These is some discussion of operations and thermal hydraulics as well.

31570 (EPRI-AP—2760, pp 2.6-2.19) **Dieng, Indonesia: 2 MWe wellhead power system.** Shulman, G. (Geothermal Power Co., Inc., Elmira, NY). Dec 1982. NTIS, PC A13/MF A01. (CONF-820691—).

From 6. annual geothermal conference; Snowbird, UT, USA (29 Jun 1982).

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The history of geothermal development in Indonesia is traced briefly. The power plant design and start-up are described. Photographs of the various systems are included. (MHR)

1510 Direct Energy Utilization

REFER ALSO TO CITATION(S) 31563

17 WIND ENERGY

1701 Availability (climatology)

31571 (CONF-8205152—, pp vp) **PCM-measuring-system for the wind-energy plant GROWIAN II.** Henkel, P.; Weikert, H. 1982. (In German). NTIS (US Sales Only), PC A18/MF A01.

From 6. conference on telemetry; Garmisch-Partenkirchen, F.R. Germany (10 May 1982).

The PCM-measuring system with as decentral encoders is very suitable for testing large plants. The measuring system can be freely programmed, quick-look representation of important parameters and long-term storage of complex measures variables make it an adequate efficient system for operators of wind energy pilot plants which are in the test phase.

1704 Economics

31572 (PNL—3962-Rev.) **Analysis of the effects of integrating wind turbines into a conventional utility: a case study. Revised final report.** Goldenblatt, M.K.; Wegley, H.L.; Miller, A.H. (JBF Scientific Corp., Wilmington, MA (USA)). Mar 1983. Contract AC06-76RL01830. 66p. NTIS, PC A04/MF A01. Order Number DE83011154.

The impact on a utility incorporating wind turbine generation due to wind speed sampling frequency, wind turbine performance model, and wind speed forecasting accuracy is examined. The utility analyzed in this study was the Los Angeles Department of Water and Power, and the wind turbine assumed was the MOD-2. The sensitivity of the economic value of wind turbine generation to wind speed sampling frequency and wind turbine modeling technique is examined as well as the impact of wind forecasting accuracy on utility operation and production costs. Wind speed data from San Gorgonio Pass, California during 1979 are used to estimate wind turbine performance using four different simulation methods. (LEW)

1705 Environmental Aspects

31573 (SERI/STR—215-1879) **Large wind turbine siting handbook: television interference assessment. Final subcontract report.** Senior, T.B.A.; Sengupta, D.L. (Michigan Univ., Ann Arbor (USA). Radiation Lab.). Jan 1983. Contract AC02-77CH00178. 58p. NTIS, PC A04/MF A01. Order Number DE83011343.

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The rotating blades of a horizontal axis wind turbine can distort the video portion of a television signal and thereby interfere with TV reception in the vicinity of the machine. The nature of this interference is described and methods are presented for calculating the zone within which the interference may be severe. Specific results are given for the MOD-OA, MOD-1 and MOD-2 machines as functions of the TV frequency.

31574 (SERI/STR—215-1880) **Study of television interference by small wind turbines. Final subcontract report.** Sengupta, D.L.; Senior, T.B.A.; Ferris, J.E. (Michigan Univ., Ann Arbor (USA). Radiation Lab.). Jan 1983. Contract AC02-77CH00178. 47p. NTIS, PC A03/MF A01. Order Number DE83011342.

Electromagnetic interference to television reception caused by small wind turbines (generating about 5 kW of power) has been studied by carrying out measurements using 1/8th-scale models of small windmills in conjunction with a microwave TV system inside an anechoic chamber. Two- and three-bladed windmills with metallized and wooden blades rectangular and trapezoidal in shape were investigated. The locally available TV Channel 9 signal was received and, after up-converting its center frequency to 4.0 GHz, was used as the rf source of the microwave TV system. The television interference (TVI) results were extrapolated to give the TVI effects of the corresponding full-scale windmills at the commercial TV Channel frequencies. Generally, it was found that the two- and three-bladed machines produced similar TVI effects, the metallized blades producing stronger interference than the wooden blades. Extrapolation of the results obtained indicate that, even at the highest TV frequency, the significant TVI effects (video distortion) produced by small wind turbines will not extend out to a distance larger than about 2.5 times the rotor diameter. At lower TV frequenies (or Channel numbers) the distance will be correspondingly smaller. Within this distance, the observed effects will generally be small to negligible over most of the region except possibly in the forward interference direction.

31575 (SERI/STR—215-1881) **Measurements of television interference caused by a vertical-axis wind machine. Final subcontract report.** Sengupta, D.L.; Senior, T.B.A.; Ferris, J.E. (Michigan Univ., Ann Arbor (USA). Radiation Lab.). Jan 1983. Contract AC02-77CH00178. 92p. NTIS, PC A05/MF A01. Order Number DE83011301.

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The electromagnetic interference to television reception caused by the 17 m Darreius at Albuquerque, NM, has been studied by carrying out measurements at a number of sites in the vicinity of the VAWT. The rf sources used were the commercial vhf and uhf TV signals available in the area. Ambient field-strength measurements showed that the signals on all TV channels except one were strong, and provided good reception at all test sites. With the antenna (properly) oriented for maximum direct signal, unacceptable interference was observed on some channels at sites out to 33 m from the WT in the forward and backward regions. With the antenna beam directed at the WT, interference varying from slight to violent were observed at all sites on some or all TV channels. A simple theoretical model has been developed for analyzing the TVI produced by a VAWT like the Darrieus. Using the model in conjunction with measured data, an approximate expression for the equivalent scattering area A of the Darrieus has been developed. It is found that A is wavelength (lambda) dependent and varies as lambda/sup 1/2/.

1706 Wind Energy Engineering

REFER ALSO TO CITATION(S) 31571

31576 (CONF-8206179—2) **Low-cost wind-power system. ASAE Paper No. 82-3005.** Brill, B.; Farsaie, A.; Smith, G.L. (Maryland Univ., College Park (USA). Dept. of Agricultural Engineering). 1982. 19p. American Society of Agricultural Engineers, St. Joseph, MI 49085.

From American Society of Agricultural Engineers summer meeting; Madison, WI, USA (27 Jun 1982).

The horizontal and vertical Savonius systems were modeled and wind-tunnel tests were conducted. The effect of system orientation and wind directionality on power output was studied. Optimally oriented, the horizontal Savonius system demonstrated up to a 99

percent increase in overall power output over the conventional system.

31577 **(DOE/BP—154) Time series models for simulating hourly wind power.** Brown, B.G.; Katz, R.W.; Murphy, A.H.; Peterson, B.A. (Oregon State Univ., Corvallis (USA). Dept. of Atmospheric Science; Picotera Systems, Inc., Corvallis, OR (USA)). Jun 1982. Contract AC79-81BP25593. 54p. (BPA—82-10). NTIS, PC A04/MF A01. Order Number DE83010899.

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The purpose of this report is to describe a procedure for simulating hourly wind power values. The procedure is based on parametric time series models. Such an approach provides a framework within which both the non-Gaussian probability distribution of wind speeds and the correlation between consecutive hourly wind speed values can be taken into account in the simulation process. Simulated time series of wind power frequently are required in loading forecasting studies and in utility planning models. The model development is described, including the statistical characteristics of wind speed, transformations of wind speed, autoregressive models of wind speed, and conversion of wind speed to wind power. The steps in the simulation procedure are dicussed in detail, including the simulation of wind speed and the conversion of simulated speed to simulated power, and presents an example of the simulation process for the Bonneville Power Administration (BPA) site at Goodnoe Hills. Some issues are examined briefly that may arise in applications of the simulation model.

31578 **(DOE/NASA/0101—1) Design and evaluation of low-cost laminated-wood-composite blades for intermediate-size wind turbines: blade design, fabrication concept, and cost analysis.** Lieblein, S.; Gougeon, M.; Thomas, G.; Zuteck, M. (Technical Report Services, Rocky River, OH (USA); Gougeon Brothers, Bay City, MI (USA)). Nov 1982. Contract AI01-76ET20320. 119p. (NASA-CR—165463). NTIS, PC A06/MF A01. Order Number DE83010077.

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As part of a program to reduce wind turbine costs, an evaluation was conducted of a laminated wood composite blade for the Mod-OA 200-kW wind turbine. The effort included the design and fabrication concept for the blade, together with cost and load analyses. The blade structure is composed of laminated Douglas fir veneers for the primary spar and nose sections, and honeycomb cored plywood panels for the trailing edge sections. The attachment of the wood blade to the rotor hub was through load takeoff studs bonded into the blade root. Tests were conducted on specimens of the key structural components to verify the feasibility of the concept. Fabrication cost was estimated to be about 15,000 to 18,000 per blade in 1982 dollars for a production rate of 100 blades per year. The major conclusion of the investigation was that the proposed wood composite blade design and fabrication concept is suitable for Mod-OA size wind turbines (125-ft diameter rotor) at a cost that is very competitive with other methods of manufacture.

31579 **(DOE/NASA/20320—44) Structural qualification testing and operational loading on a fiberglass rotor blade for the Mod-0A wind turbine.** Sullivan, T.L. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Mar 1983. Contract AI01-76ET20320. 25p. (NASA-TM—83309). NTIS, PC A02/MF A01. Order Number DE83011565.

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The original blades used in the 200-kW Mod-0A wind turbine program began to show signs of structural problems after less than 1000 h of operation. These blades were made of aluminum with riveted construction typical of an airplane wing. In addition to having structural problems, these blades were very expensive and showed little potential for reduced cost in volume production. Therefore, a program was initiated to develop blades for Mod-0A service that were not only structurally adequate but that showed potential for low cost when produced in significant quantities (>100). As a part of this program a fiberglass blade was designed and two blades were fabricated using a tape winding process. During the design phase of this program, two areas of the blade were identified where structural testing in the laboratory would reduce the risk of problems in the field. The first area was the blade root retention where a transition between fiberglass and steel is made. Here the concern was debonding between steel and fiberglass under fatigue loading. The second area was the outboard portion of the main structural spar of the blade. Here the concern was buckling of the spar under the limit load condition. Therefore, these two areas were qualified by test. This report describes these tests and their results. In addition, a comparison is made of expected blade loading and loading measured in the field. Finally, the report documents results of measurements of natural frequency, damping ratio, and deflection under load made on the operational blades.

31580 (Juel-Spez—129, pp 1-21) **Experience with reliability and maintenance of the F.L. Smidth aeromotors.** Westh, H.C. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

A survey of the development and manufacture of a total of 19 F.L. Smidth wind energy converters erected in Denmark is given. These plants have been in operation for more than 20 years. Two basic models were manufactured, one model with 2 and the other with 3 rotor blades. The main characteristics of both models are described, the blade construction is explained and the control and safety system is introduced.

31581 (Juel-Spez—129, pp 23-38) **Erection and maintenance of GROWIAN.** Helm, S. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

The construction and maintenance work of the GROWIAN wind energy plant is described. First the construction of the plant is explained, which resulted from the synthesis of cost and technical aspects. Individual parts of the plant have to be replaced during the estimated 20 year life. The dimensions of the plant therefore make it necessary to take special account of the maintenance aspect. Of the three possibilities, which would comply with this criterion, i.e. a construction requiring hardly any maintenance, or the availability of large cranes or the installation of aids in the plant, the latter was preferred from the point of view of costs.

31582 (Juel-Spez—129, pp 39-46) **Reliability and maintenance of the Swedish LS-WECS at Marglap.** Tillberg, G. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

The WTS 3 wind energy plant in Sweden is the prototype for a large plant. The project was started in 1978. The first test run of the plant took place in January 1982. The test period extends from 1982 to 1984. Technical data of the plant and its site are described. The planned maintenance programme and associated organisaiton are explained in detail. The use of parts of the plant which are environmentally acceptable was included in the project stage. The maintenance cost of the plant, over a life of 30 years, should be 2 to 3 percent of the total costs.

31583 (Juel-Spez—129, pp 47) **Estimating the overall reliability and performance of large wind turbines in a utility application based on research test data.** Vachon, W.A. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

A 200 kW wind energy plant was tested over a long period of time, regarding reliability and performance for use in an electricity supply system. The test results were obtained when the plant was a prototype and research plant, and not yet a part of the infrastructure of the local electricity company. Faults in the plant, and

repairs, maintenance and servicing tasks, which had to be carried out by local organisations or servicing firms, were particularly examined. The results show that the estimated performance of the plant can be improved by up to 13 percent, as soon as it is used by the electricity company.

31584 (Juel-Spez—129, pp 49-77) **Commissioning of two 630 kW wind turbines.** Kristensen, P. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

Description of commissioning of two NIBE wind turbines, which were built in 1979. A commissioning programme was developed for both plants. The asynchronous generators, loss of output and loss of the network were tested. Details of the test criteria and a survey of the faults which occurred during testing are given. Conclusions were drawn from the results for the development and construction of future plant.

31585 (Juel-Spez—129, pp 79-91) **Naesudden a Swedish WTS prototype.** Andersson, B. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

The wind energy plant of the Naesudden type is built on the Swedish island of Gotland. The rotor of this plant consists of two blades with a total diameter of 75 metres. The rotor has a speed of 25 rpm and has an output of 2 MW at a wind speed of 13 metres/sec. The development of the heavy mechanical parts of the plant is complete and production has started. The total plant will be commissioned at the start of 1982. The maintenance and inspection work to be carried out during commissioning is described, as well as the construction of the plant.

31586 (Juel-Spez—129, pp 93-124) **Test experiences with aluminium blades on the DOE/NASA MOD-0A wind turbine.** Vachon, W.A. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

The MOD-0A wind turbine is part of the first generation of plant, which has been tested by NASA for the American Department of Energy. The development of the rotor blades of this plant was based on the design of the American aircraft industry. The development of rotor blades and their tests are described. The rotor blades had to be repaired 4 times or replaced taking a long time during 5000 hours of running. The faults which occurred and reports on the consequences which arose for the further development of the rotor blades are reported.

31587 (Juel-Spez—129, pp 125-136) **Rotorblades for GROWIAN.** Hau, E. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

The construction of the rotor blades was regarded as particularly important in the development of the GROWIAN wind energy plant. In connection with the construction of rotor blades for the test programme and the prototype, a special rotor blade technology programme was compiled. Design criteria were dealt with and alternative methods of rotor construction for large wind turbine plants were investigated in the context of this programme are detailed. The aerodynamic design, the design concept, the rotor blade construction and the test programme.

31588 (Juel-Spez—129, pp 137-149) **Inspection of the Nibe wind-turbine 'A' after 1000 h of operation.** Friis, P. Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

The main point of the Danish wind energy programme was the completion of the two 2 kW demonstration plants, the Nibe A and Nibe B wind turbines. The maintenance and repair work at the Nibe A plant after a running period of 1000 hours is reported. The mechanical and electrical installations and the support structure was insepcted and replaced in the context of the maintenance work. The components inspected and the faults found are surveyed..

31589 (Juel-Spez—129, pp 151-168) **Visite of the two Nibe wind-turbines, April 30 - a short description of the turbines.** Sep 1981. NTIS (US Sales Only), PC A08/MF A01. (CONF-8104184—).

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

In 1977, the Danish Department of Energy together with the Danish energy industry started an investigation of the use of wind power to complement the country's electricity supply. The two Nibe plants were designed and constructed in the context of this programme. The report describes the design of both wind power plants which except for the rotor construction and the control systems, are identical.

31590 **(Juel-Spez—129) Implementing agreement of cooperation in the development of large scale wind energy conversion systems.** (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Projektleitung Energieforschung). Sep 1981. 170p. (CONF-8104184—). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750261.

From 6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems; Aalborg, Denmark (29 Apr 1981).

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On April 29/30, 1981, an experts' seminar was held in Aalborg (Denmark) in order to exchange experience on European activities in the field of wind energy conversion. The 10 papers of the seminar have been stored in the data base separately.

20 ELECTRIC POWER ENGINEERING

REFER ALSO TO CITATION(S) 31018

2001 Power Plants And Power Generation

REFER ALSO TO CITATION(S) 31086, 31155, 31919, 31919, 32268

31591 (ANL—82-62, pp 329-337) **Control problems in combined-cycle MHD-steam power plants: effects of turbine configurations on dynamic response.** Rudberg, D.A.; Heikes, C.A.; Shovic, J.C. (Montana State Univ., Bozeman). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Dynamic control has been applied to first-principle models of two 210 MWe combined-cycle MHD-steam power plants. Both plants are reheat turbine configurations, operating with shell-and-tube oxidant preheaters which deliver air enriched to 30 percent oxygen. Their distinguishing differences are the manner in which the blend air compressor (BAC) turbine is connected to the steam generator. Simulations show that conventional driving of the BAC turbine with steam from the hot reheat header yields a system that can follow a ramp-up demand change of 1 percent per minute without significant effect on main steam pressure and with quite acceptable error of power generation. However, such a plant has difficulty in following a 10 percent per minute ramp-up demand change. Significant errors in either power generation or in main steam pressure result, depending on the mode of control that is applied. No control has been found that can reduce both errors to low levels at the 10 percent per minute demand change rate. A plant version with the BAC turbine driven from main steam and exhausting into the cold reheat line is quite different in response and controllability. An exceptionally fine balance between steam generation and consumption is struck (especially in smaller, more oxygen-enriched units), yielding plants that follow a 10 percent per minute ramp-up

of power demand with insignificant error in both power generation and main steam pressure. It is suggested that current plant configurations be reviewed in light of these findings.

31592 **(BMFT-FB-T—82-237) Increase of the overall plant efficiency and electrical power of existing steam turbine power plants by conversion to combined gas and steam cycle power plants.** Knipfer, A. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 192p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750237.

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In view of the brief period required for erection, the short start-up time and low specific capital costs, gas turbine power plants are mainly used for peak load supply. The disadvantage of a gas turbine plant is its low efficiency rating. In the case of a combined gas and steam cycle power plant in which an existing steam turbine is connected to a gas turbine, the GT exhaust heat may be utilized in the steam turbine. In this study two possibilities are investigated for the utilization of this exhaust heat. Either the exhaust gas preheats the feedwater of the steam turbine cycle or it is used in the boiler as combustion air. The findings of this investigation indicate that overall plant efficiency can be increased by up to 4% points as compared with the separate arrangement of gas turbine and steam turbine plants. The power gain is as much as 15%. The calculation of economic effectiveness indicates that only the variant incorporating exhaust-gas preheating of the feedwater is economically effective. The variant where the GT exhaust gas is used as combustion air in the boiler also results in an increase in power and efficiency; it is, however, not economically effective, above all due to the extended period of outage required for conversion of the boiler.

31593 **(DOE/ER/10766—10) Mitigation of biofouling using coatings, year 3. Quarterly progress report No. 2.** Meyer, A.E. (Arvin Calspan, Buffalo, NY (USA). Applied Technology Group). 21 Mar 1983. Contract AC02-80ER10766. 10p. NTIS, PC A02/MF A01. Order Number DE83011305.

Bacterial densities on test plates that were exposed for up to 20 days were determined from counts made on representative scanning electron photomicrographs. The growth of mineral scale on the plates was tracked by energy-dispersive x-ray analysis. The contact potential of the outer surface of the plates remains relatively constant throughout the exposure period and from surface-to-surface. Medium energy brass, glass, and stainless steel plates, typifying the surface properties of most common heat transfer surfaces, are considerably more fouled than are very low and low-energy plates after 30 days of exposure. The low energy surface fouls the least of all over the long-term and demonstrates the ability to shed some of its acquired fouling. The low energy surface acquires mineral deposits at a much slower rate than the other surface types.

31594 **(EPRI-AP—2888) Investigation and research of specific combustion-turbine and combined-cycle field problems. Second annual report.** (Aptech Engineering Services, Inc., Palo Alto, CA (USA)). Mar 1983. 134p. NTIS, PC A07/MF A01. Order Number DE83901976.

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An investigation of and research efforts dealing with specific combustion-turbine and combined-cycle field problems are summarized. The problem of compressor-wheel failure is detailed, and pieces of the burst wheel are examined by metallographic and fractographic techniques. Results of one-dimensional, two-dimensional, and refined fracture mechanics analyses are presented.

31595 **(EPRI-AP—2938) Reliability and availability analyses of coal-fired units: validation of a predictive methodology. Final report.** Neely, M.; Gardner, N. (Arinc Research Corp., Annapolis, MD (USA)). Mar 1983. 161p. NTIS, PC A08/MF A01. Order Number DE83901969.

This report describes the application of an Electric Power Research Institute (EPRI)-sponsored reliability, availability, and maintainability (RAM) prediction methodology (presented in EPRI Report AP-2202) to operating and hypothetical coal-fired electric power generation units. Analysis of the operating coal-fired unit (CFU) validated the accuracy of the methodology and the associated computer software. Analysis of the state-of-the-art CFU design yielded RAM predictions that were consistent with the high degree of redundancy in the unit's design, and included predictions of the performance and potential critical areas of future units. Analysis of the hypothetical CFU design demonstrated that the methodology can be used to predict the average performance of a generic class of units. The report describes how RAM analysis, applied at the unit level, can complement a utility company's existing procedures. The capabilities of UNIRAM, the computer program developed to simplify such analyses, are also discussed. Appendixes to this report present the RAM models of the three CFUs studied, component-level mean-time-between-failures and mean-downtime estimates, and a summary of historical RAM data derived from the operating CFU's outage reports.

31596 **(EPRI-CS—2923-Vol.1) VERA2D: program for 2-D analysis of flow, heat, and mass transfer in evaporative cooling towers. Volume 1. Mathematical formulation, solution procedure, and applications. Final report.** Majumdar, A.K.; Singhal, A.K.; Spalding, D.B. (CHAM of North America, Inc., Huntsville, AL (USA)). Mar 1983. 107p. NTIS, PC A06/MF A01. Order Number DE83901966.

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VERA2D is a computer program for steady two-dimensional analysis of flow, heat, and mass transfer in wet cooling towers. The code is written in FORTRAN IV language and is applicable to the following types of towers: (1) mechanical draft crossflow; (2) mechanical draft counterflow; (3) natural draft crossflow; and (4) natural draft counterflow. The description of VERA2D has been provided in two volumes. Volume 1 describes the mathematical formulation, solution procedure, and several applications of the code. Some overall features of the code such as capabilities and limitations are described in both the volumes.

31597 **(EPRI-CS—2923-Vol.2) VERA2D: program for 2-D analysis of flow, heat, and mass transfer in evaporative cooling towers. Volume 2. User's manual. Final report.** Majumdar, A.K.; Singhal, A.K. (CHAM of North America, Inc., Huntsville, AL (USA)). Mar 1983. 88p. NTIS, PC A05/MF A01. Order Number DE83901930.

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VERA2D is a computer program for steady two-dimensional analysis of flow, heat, and mass transfer in wet cooling towers. The code is written in FORTRAN IV language and is capable to the following types of towers: mechanical draft crossflow; mechanical draft counterflow; natural draft crossflow; and natural draft counterflow. The description of VERA2D has been provided in two volumes. Volume 1 describes the mathematical formulation, solution procedure, and several applications of the code. Volume 2 is the user's manual which explains: how to prepare input data; how to interpret output; specific examples of input/output features; code structure and functions of subroutines; and compiled empirical data for the commonly used fills. Some overall features of the code such as capabilities and limitations are described in both volumes.

31598 **(EPRI-CS—2925) Comparative economics of indirect and direct dry/wet-peaking cooling-tower systems. Final report.** Mitchell, R.D. (Mitchell (Robert D.), Larkspur, CO (USA)). Mar 1983. 198p. NTIS, PC A09/MF A01. Order Number DE83901968.

The results of studies performed to determine the comparative economics of indirect and direct dry/wet-peaking cooling tower systems for 200-MW to 1000-MW coal-fired power plants at a semi-arid western United States site are presented. Comprehensive computer analyses were performed to optimize the design and evaluate the performance and economics of the alternative dry/wet-peaking cooling tower systems for a range of fuel and water costs and makeup water requirements. The direct dry/wet-peaking tower system evaluated better than the indirect dry/wet-peaking tower system over the entire range of design and economic criteria considered. The use of direct dry/wet-peaking tower systems requiring less than 40% of the makeup water required by a conventional wet cooling tower system was estimated to increase total busbar energy production costs by as little as 1.2% to 3.3%, depending on fuel and makeup water costs, compared to a base case

conventional wet tower system. A preliminary economic comparison showed little difference between the economics of a direct dry/wet-peaking cooling tower system and the most promising advanced concept ammonia-based dry/wet cooling system currently under development. The results of these studies should add significantly to the data base available to utilities for use in the preliminary evaluation and selection of the most economically viable water-conserving cooling for a given application.

31599 **(EPRI-CS/NP—2945) Modular modeling system validation: transients in fossil and nuclear power plants.** Shor, S.W.W. (ed.). (Bechtel Group, Inc., San Francisco, CA (USA)). Mar 1983. 246p. NTIS, PC A11/MF A01. Order Number DE83901927.

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The Modular Modeling System (MMS), a flexible, easy-to-use system for modeling transients in steam electric power plants on a general purpose computer, has been used to model transients in the combined boiler and balance of plant of a 550 MW oil-fired power plant, in the reactor coolant system and steam generators of a pressurized water reactor (PWR) with once through steam generators, and in the same systems of a pressurized water reactor with recirculating steam generators. The models were assembled from preprogrammed modules, each representing the theoretical behavior of an identifiable component of the power plant and requiring only the addition of parameters representing its quantified characteristics and the addition of interconnection instructions to permit it to be incorporated in the model. All three models were used to simulate test transients performed on actual power plants and the results are compared with plant test data. In most cases the dynamic accuracy of the simulation was satisfactory, although in the case of several component modules some question remains as to whether discrepancies between amplitudes of transients as modeled and as measured in the plant lie in the module's predictions or in recorded plant data. The MMS proved to be easy to learn to use (two of the modelers being relatively inexperienced engineers). The cost of computation was also reasonable, varying from a few tens of dollars to a few hundred dollars per transient run, depending on the complexity of the model and the rate of change and duration of the transient.

2002 Environmental Aspects

REFER ALSO TO CITATION(S) 31089, 31095, 31096, 31143, 31828, 32273

31600 **(AD-A—121454/3) Power plant discharge structure, delta stabilization dike, and on-land taconite tailings disposal, Reserve Mining Company, Silver Bay, Lake County, Minnesota. Final environmental impact statement.** (Corps of Engineers, St. Paul, MN (USA). St. Paul District). Mar 1977. 323p. NTIS MF A01.

Reserve Mining Company proposes to install a heated water discharge structure in Lake Superior. This structure would enable Reserve's Lakeside Power Plant to discharge approximately 106,000 gpm of delta T12 degrees F cooling water into Lake Superior. The delta stabilization dike would be an attempt to stabilize the tailings delta at Silver Bay and prevent the further release of fibers into Lake Superior. Reserve proposes to modify its existing taconite operation to convert from in-lake to on-land disposal of taconite tailings.

31601 (ANL—82-62, pp 587-618) **Particle collection by cyclones at high temperature and pressure.** Wang, J.C.F.; Libkind, M.A. (Sandia National Labs., Livermore, CA). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

We have completed an experimental study using cyclones as a part of a particulate sampling system at temperatures up to 1100 K and pressures up to 11 atm. The particle collection efficiency of three different cyclones at a fixed cyclone inlet velocity was found to decrease as temperature increased or pressure decreased. This effect cannot be explained by the existing cyclone models. The 50 percent particle cut-size of each cyclone appears to correlate well with a nondimensional parameter related to the Reynolds number and the square root of the Stokes number. This correlation suggests that the cyclone efficiency depends on the viscosity and density of the sampled gas. Our results are compared with those of other investigators.

31602 **(DOE/METC—83-44) Calcium silicate cements for desulfurization of combustion gases. Final report, October 1, 1980-March 31, 1982.** Yoo, H.J.; McGauley, P.J.; Steinberg, M. (Brookhaven National Lab., Upton, NY (USA)). Jun 1982. Contract AC02-76CH00016. 91p. NTIS, PC A05/MF A01. Order Number DE83008767.

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Commercial calcium silicate bearing Portland Cement Type III (PC III) has been identified as a promising regenerative sorbent for the removal of sulfur in the fluidized-bed combustion (FBC) of coal. The PC III is agglomerated in a drum pelletizer by a low energy, low cost agglomeration technique and cured to form pellets in the size range suitable for operating FBC units. These agglomerated cement sorbent (ACS) pellets are hard, spherical in shape, become highly porous upon drying, and can be directly used in the FBC. The chemical/physical properties of ACS pellets prepared were determined by thermogravimetric analysis (TGA), scanning electron microscopy (SEM), mercury porosimetry and BET surface area analysis. TGA measurements show that the 2-hour sulfation capacity of the ACS pellet is about 50% (based on available CaO content) or better at 958°C and does not deteriorate with cyclic use. The degree of regeneration is almost complete (above 95%) during cyclic use. The rate of sulfation is found to be a strong function of reaction temperature, sulfur loading of the pellet, pellet size and SO_2 concentration of feed gas stream. A small 40 mm I.D. bench scale fluid bed reactor was used to determine the sulfur removal efficiency of the ACS pellet as well as the concentration of the regenerated SO_2, using propane gas as a fuel and a reducing agent. No SO_2 was detected in the flue gas stream until the ACS pellet is saturated to 75% of its capacity. An engineering design and economic evaluation are developed using ACS pellets in the regenerative desulfurization process applied to industrial steam generators. This study consisted of an investigation of the operating economy and the cost of steam production when sorbents from different sources are used in a 200,000 lb/hr steam generating plant.

31603 **(DOE/RA/50219—T1) Study of the behavioral and biological effects of high-strength 60-Hz electric fields. Quarterly technical progress report number 10, 18 December 1982-18 March 1983.** (Southwest Research Inst., San Antonio, TX (USA)). 20 Apr 1983. Contract AC02-80RA50219. 4p. NTIS, PC A02/MF A01. Order Number DE83008226.

The objective of this contract is to use the baboon as a surrogate for the human in studies of the possible deleterious effects of exposure to high strength, 60 Hz electric fields. The specific aims of this contract are to (1) design and construct an exposure facility in which baboons can be exposed to an electric field up to 60 kV/m in intensity for experiments and (2) to develop computer models relating the fields and currents produced in both baboons and humans by exposure to high strength, 60 Hz electric fields.

31604 **(EPRI-CS—2949) Limestone FGD systems data book. Final report.** Smith, E.O.; Blythe, G.M.; Cannell, A.L.; Meadows, M.L.; Swenson, D.O. (Black and Veatch Consulting Engineers, Kansas City, MO (USA); Radian Corp., Austin, TX (USA)). Mar 1983. 690p. NTIS, PC A99/MF A01. Order Number DE83901899.

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Selecting and installing a flue gas desulfurization (FGD) can be a difficult task for the utility engineer. Often, the technology is unfamiliar and the array of alternatives disconcerting. Approximately 33,000 MW of FGD systems are now operating and another 39,000 MW are planned or under construction. With the current EPA regulations requiring an FGD system on essentially every new coal-fired utility generating unit, the ability to decide on the most advantageous FGD system on technical, environmental, and economic bases is critical to the success of the unit and can result in substantial improvements in the reliability of the system. This manual presents discussions of the chemical processes involved in SO_2 removal using limestone, process control methods, mechanical component design, and methods of requesting and evaluating pro-

posals. The discussion of mechanical components includes numerous examples of existing utility installations and problems.

31605 **(EPRI-EA—2892) Planning studies for measurement of chemical emissions in stack gases of coal-fired power plants. Final report.** Barrett, W.J.; Gooch, J.P.; Dahlin, R.S. (Southern Research Inst., Birmingham, AL (USA); Battelle Columbus Labs., OH (USA); Roth Associates, Inc., Rockville, MD (USA)). Mar 1983. 216p. NTIS, PC A10/MF A01. Order Number DE83901989.

Airborne emissions from coal-fired power plants consist of sulfur, nitrogen, and carbon oxides, as well as traces of certain metals or elements, radionuclides, and organic compounds that have the potential of producing adverse health effects if inhaled. To assess this potential toxicity, samples must be obtained and characterized on the basis of quantity, their chemistry, and toxicity. Sample representativeness and use of proper chemical-biological procedures are the critical for providing input into current research directed toward source apportionment and inhalation toxicology. Obtaining a valid stack sample (gases and particles) from each of more than 1500 US coal-fired power plant is not practical; consequently 33 plants have been selected, taking into account plant design and operating parameters that can affect the characteristics of stack chemical emissions. Since such a program has an estimated cost of $20 million over many years, it is recommended that the initial program consists of sampling only six of the 33 units, selected with EPRI guidance, at an estimated cost of $3.5 million over a 30 month period. The plan is directed at in-stack sampling, plume and atmospheric transformations being beyond the project scope. Various stack sampling methods are considered. For particles, a modified SASS train seems best, and for gases, either resin traps or impingers are probably best. Artifact formation must be minimized. Chemical analysis procedures are to be guided by the known toxicity of species present. Procedures are outlined for organics (volatile and nonvolatile), trace elements, inorganics, and gases. Bioassay methods are restricted to in vitro, subdivided into those assays that detect genetic and direct cellular toxicity.

31606 **(PB—83-130229) Estimates of sulfur oxide emissions from the electric utility industry. Volume I: summary and analysis. Final report.** (Illinois Univ., Urbana (USA)). Nov 1982. 132p. NTIS, PC A07/MF A01.

This report was prepared as part of the Electric Utility Analysis Project, a research project supported by the Environmental Protection Agency. The objective of the report is to provide detailed information on emissions of sulfur oxides (SOx) in the atmosphere from electric generating plants over the period, 1976-1980. Annual emissions estimates for all generating plants were calculated using fuel use, fuel quality and plant configuration data from several sources. The analysis of yearly emissions from 1976-1980 show a gradual reduction in emissions from the utility industry of about 7.7 percent. The reductions are attributed to use of cleaner coals and increased use of SO_2 scrubbers. Analysis also shows that a subset of plants with high emissions account for a substantial share of industry capacity and coal use. Approximately 10% of the plants produced roughly 85% of the SOx emissions and account for 50% of total capacity. Volume II presents selected statistics for the 237 plants which were the largest emitters of SOx during the 1976-1980 period.

31607 **(PB—83-130237) Estimates of sulfur oxide emissions from the electric utility industry. Volume II: databook. Final report.** (Illinois Univ., Urbana (USA)). Nov 1982. 288p. NTIS, PC A13/MF A01.

This report was prepared as part of the Electric Utility Analysis Project, a research project supported by the Environmental Protection Agency. The objective of the report is to provide detailed information on emissions of sulfur oxides (SOx) in the atmosphere from electric generating plants over the period, 1976-1980. Annual emissions estimates for all generating plants were calculated using fuel use, fuel quality and plant configuration data from several sources. The analysis of yearly emissions from 1976-1980 show a gradual reduction in emissions from the utility industry of about 7.7 percent. The reductions are attributed to use of cleaner coals and increased use of SO_2 scrubbers. Analysis also shows that a subset of plants with high emissions account for a substantial share of industry capacity and coal use. Approximately 10% of the plants produced roughly 85% of the SOx emissions and account for 50% of total capacity. Volume I presents a summary of fuel use and emissions information as well as results of analyses of the data.

31608 **(PB—83-131045) Use of sorbents to reduce SO_2 emissions from pulverized coal flames under low-NOx conditions. Progress report Feb-Nov 81.** Case, P.; Heap, M.; Lee, J.; McKinnon, C.; Payne, R. (Energy and Environmental Research Corp., Santa Ana, CA (USA)). Oct 1982. 90p. NTIS, PC A05/MF A01.

The report summarizes data obtained to date under a contract relating to the use of dry sorbents to control SO_2 emissions from pulverized-coal-fired boilers. Experimental investigations are being carried out in parallel at two scales. (1) at bench scale, a boiler simulator furnace has been designed to identify the process parameters controlling sulfur capture by sorbent injection (this furnace will also be used to identify potential problem areas associated with the application of the technology in the field; and (2) at pilot scale, tests have been carried out with large (50 million Btu/hr firing rate and above) prototype low-NOx burners with sorbent injection (these tests were added to test series whose primary function was the optimization of the burner for flame stability and low-NOx operation). Since this is a progress report, it is inappropriate to draw conclusions from a study that is in its infancy. Data has been obtained which show that calcium utilization efficiencies of 25% are possible if the thermal history of the sorbent is controlled.

31609 **(PB—83-163154) Waste and water management for conventional coal combustion: assessment report, 1980. Final report Sep 79-Oct 80.** Santhanam, C.J.; Cooper, C.B.; Balasco, A.A.; Kleinschmidt, D.E.; Bodek, I. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Jan 1983. 825p. NTIS, PC A99/MF E04.

The report gives results of an assembly, review, evaluation, and reporting of data from research and development, as well as commercial activities, as of mid-1980 in the areas of: flue gas cleaning (FGC) waste disposal/utilization; and power plant water management, including recycle/treatment and reuse. The purpose of these activities was to assist EPA in conducting an on-going research and development program in these two areas. The report focuses on: (1) evaluation of the technical, regulatory, economic, and environmental aspects of FGC waste disposal/utilization options (recommendations were made on measures to fill information gaps, including research to develop additional data); and (2) evaluation of the technical, regulatory, engineering/economic, and environmental aspects of power plant water recycle/treatment/reuse. Again, recommendations were made to cover gaps existing in 1980.

31610 **(PB—83-165266) Disposal of spent sorbent from dry FGD (flue gas desulfurization) processes. Final report Oct 79-Jan 81.** Stephan, J.M.; Rosenberg, H.S.; Bennett, R.B. (Battelle Columbus Labs., OH (USA)). Feb 1983. 81p. NTIS, PC A05/MF A01.

The report gives results of a study of sintering and leaching mechanisms of fly ash/spent sodium sorbent mixtures from a dry injection flue gas desulfurization (FGD) process. It includes an estimate of the economics of pelletizing and sintering to handle the fly ash and spent sorbent from a 500 MW power plant burning low sulfur western coal using a dry injection FGD process.

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REFER ALSO TO CITATION(S) 31904, 31906

31611 (CONF-8205152—, pp vp) **Remote control technology at electric utilities.** Vosswinkel, E. 1982. (In German). NTIS (US Sales Only), PC A18/MF A01.

From 6. conference on telemetry; Garmisch-Partenkirchen, F.R. Germany (10 May 1982).

In public fuel and power supplies, network control systems are commonly used by all industries which operate transport or electrical distribution supply networks. These include: networks for electric energy supply and distribution, networks for the supply of

gas and water, and networks for energy supply to local and overland transport. Remote control systems are an indispensible components of these network control projects; they have the task of data acquisition and guaranteeing safe and rapid data transmissions between controlled object located in a region and the central control station.

31612 **(DOE/ET/29364—T1) Locating unstable equilibrium points for power-system transient-stability analysis.** DeMarco, C.L.; Bergen, A.R. (California Univ., Berkeley (USA). Dept. of Electrical Engineering and Computer Sciences). 1982. Contract AC01-79ET29364. 8p. NTIS, PC A02/MF A01. Order Number DE83011423.

This work analyzes several approximate methods for efficiently locating unstable equilibrium points (u.e.p.'s) of the structure preserving model for transient stability analysis as developed by Bergen and Hill. The role of these u.e.p.'s in predicting the region of attraction for the post fault stable equilibrium points via Lyapunov techniques is discussed. The sensitivity of Lyapunov energy to error in the approximate u.e.p.'s is analyzed. The approximations are applied to a simple six bus, four generator system, with numerical results of the various approaches contrasted.

31613 **(DOE/ET/29364—T2) Probabilistic steady-state and dynamic security assessment.** Wu, F.F.; Tsai, Y.K.; Yu, Y.X. (California Univ., Berkeley (USA)). 1982. Contract AC01-79ET29364. 9p. NTIS, PC A02/MF A01. Order Number DE83011422.

A comprehensive conceptual framework for probabilistic steady-state and dynamic security assessment is presented. A unified approach to steady-state and dynamic security is first proposed. We characterize the security of a power system in terms of power injections (load demand and generation). We define the steady-state security region as the set of injections for which the system can be operated with no line overload and abnormal voltages. We define the dynamic security region with respect to a fault as the set of injections for which the system is transiently stable. We say that the system is secure at time t, (1) if there is no disturbance at t and the injection lies within the steady-state security region, (2) if there is a fault at t and the injection lies within the dynamic security region. For a given scenario, which consists of the perfect load forecast and the precise time and nature of faults to occur, the time to insecurity T is a real number and can be found. It is used as the measure of system security.

31614 **(EPRI-EL—1960-Vol.6) Human-factors review of electric-power-dispatch control centers. Volume 6. Information management and presentation. Final report.** Miller, R.J.; Najaf-Zadeh, K.; Darlington, H.T.; McNair, H.D. (Stagg Systems, Inc., Tustin, CA (USA)). Mar 1983. 196p. NTIS, PC A09/MF A01. Order Number DE83901939.

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The application of human-factors disciplines to electric-utility control-center operations can minimize human-engineering deficiencies. After detailed examination of the information the operator requires, certain criteria emerge: more data must be converted into meaningful information, information must be easily comprehended by operators, and operating states or conditions and time domains should be considered. Information presentation is examined considering human factors guidelines for CRT information presentation including information access, display parameters, display formatting, single-line displays, group displays, tabular displays, bar graph displays, trend displays, windowing, CRT image transformations and audible alarms. Presently available technology and hardware devices such as mapboards, CRT monitors, display generators, keyboards, cursor control devices, hardcopy printers, and telephone systems were analyzed to identify their benefits and restrictions. Near future technologies related to CRT display tubes, flat panel displays, projection or large screen systems, voice recognition, and voice synthesis were also analyzed for potential application to system modification or new design.

31615 **(KFK-PDV—210) Application of PEARL for the control of substations in an electrical power distribution system (20 and 110 kV) of a regional power utility.** Mayr, U.; Zigan, M. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Prozesslenkung mit Datenverarbeitungsanlage). Jun 1982. 30p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750011.

From the very beginning, the system control centre at Deggendorf was established as a pilot project for the application of PEARL. Most of the application programs (95%) for the double process control computers are written in PEARL. These are programs with an average length of 15 k byte and a total length of 1.000 k byte. Now that the project is completed it can be definitely stated that the decision to use PEARL has been correct and all those connected with the project are convened of the advantages of PEARL. That means, that the OBAG power utility will recommend this programming language to other companies.

31616 **(KFK-PDV—219) Dynamic stability calculations for power grids employing a parallel computer.** Schmidt, K. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Prozesslenkung mit Datenverarbeitungsanlage). Jun 1982. 107p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750012.

The aim of dynamic contingency calculations in power systems is to estimate the effects of assumed disturbances, such as loss of generation. Due to the large dimensions of the problem these simulations require considerable computing time and costs, to the effect that they are at present only used in a planning state but not for routine checks in power control stations. In view of the homogeneity of the problem, where a multitude of equal generator models, having different parameters, are to be integrated simultaneously, the use of a parallel computer looks very attractive. The results of this study employing a prototype parallel computer (SMS 201) are presented. It consists of up to 128 equal microcomputers bus-connected to a control computer. Each of the modules is programmed to simulate a node of the power grid. Generators with their associated control are represented by models of 13 states each. Passive nodes are complemented by 'phantom'-generators, so that the whole power grid is homogenous, thus removing the need for load-flow-iterations. Programming of microcomputers is essentially performed in FORTRAN.

31617 **(KFK-PDV—220) Computer aided structured data handling for transparent application programs.** (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Prozesslenkung mit Datenverarbeitungsanlage). Aug 1982. 360p. (In German). NTIS (US Sales Only), PC A16/MF A01. Order Number DE83750408.

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In "computer aided power-distribution-nets" several management-problems arise with big datasets. Therefore it is necessary to apply to Database-Management-Systems (DBMS) for the description and the handling of data-structures, data-sets and data-accesses. This report describes structures, implementations and applications of PRIMO (Process Real Time Information Management System for On-line Control). PRIMO is implemented on PDP 11- (Operating-System RSX 11M) and VAX 11-Computers (Operating-System VMS) of the DEC (Digital Equipment Corporation). The report is divided into three parts: Part 1 introduces the PRIMO-concept and possible applications in "computer aided power-distribution-nets". Part 2 contains the PRIMO 30-structures (for PDP 11). Then an application in a "computer aided power-distribution-net" is described and examples of data-structures and management, respectively, and disposition-functions are given. Part 3 contains the PRIMO 40-structures (for VAX 11). Selected examples demonstrate the description of data-structures (conceptual Scheme), access-paths (external scheme and database-accesses (embedded in PASCAL-programs).

31618 **(TASC-TR—3016-3) Research progress in dynamic security assessment.** Mealy, G.L.; Acharya, N.A.; Pisano, A.D. (Analytic Sciences Corp., Reading, MA (USA)). 31 Dec 1982. Contract AC01-79ET29038. 129p. NTIS, PC A07/MF A01. Order Number DE83010821.

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Progress achieved during a three-year research effort in power-system security assessment is discussed. The areas discussed are: power-system modeling, state estimation, structure decomposition, state forecasting, clustering and security measure development. A detailed dynamic model of a multimachine power system has been developed. The model includes the effects of stochastic load variations and possible transmission line and/or generator outages. A process state estimator was developed to estimate the long-term dynamic behavior of the power system. The algorithm is in a form identical to the extended Kalman filter but has a modified process noise driving term. A two-stage structure estimation technique was proposed for identifying the power system network configuration from available measurements. Two approaches to structure decomposition were investigated. A time-scale decomposition of the system equations, based on a singular perturbation approach, was evaluated using a detailed model of a generating system. This approach to system order reduction was extended to the process state estimation equations. Spatial decomposition was examined by applying an optimal network decomposition technique to a 39-bus test system. Stochastic approximation based approaches to estimator simplification were examined. Explicit expressions were obtained for the evolution of the first and second moments of the system state which take into account the possibility of changes in system network configuration. Clustering criteria were developed for use in reducing the number of system disturbances that must be considered.

31619 **Gaseous insulators for high voltage electrical equipment.** Christophorou, L.G.; James, D.R.; Pace, M.O.; Pai, R.Y. (to Dept. of Energy). US Patent 4,257,905. 24 Mar 1981. Filed date 31 May 1979. vp.

PAT-APPL-044787.

Gaseous insulators comprise compounds having high attachment cross sections for electrons having energies in the 0-1.3 electron volt range. Multi-component gaseous insulators comprise compounds and mixtures having overall high electron attachment cross sections in the 0-1.3 electron volt range and moderating gases having high cross sections for inelastic interactions with electrons of energies 1-4 electron volts. Suitable electron attachment components include hexafluorobutyne, perfluorobutene-2, perfluorocyclobutane, perfluorodimethylcyclobutane, perfluorocyclohexene, perfluoromethylcyclohexane, hexafluorobutadiene, perfluoroheptene-1 and hexafluoroazomethane. Suitable moderating gases include N_2, CO, CO_2 and H_2. The gaseous insulating mixture can also contain SF_6, perfluoropropane and perfluorobenzene.

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REFER ALSO TO CITATION(S) 31770, 31894

31620 **(EGG-M—29482) Some theoretical and computational aspects of a simplified subchannel model.** Neil, C.H. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 7p. (CONF-830304—20). NTIS, PC A02/MF A01. Order Number DE83010402.

From American Nuclear Society topical conference on computational methods; Salt Lake City, UT, USA (28 Mar 1983).

Some recently obtained results are presented concerning the qualitative behavior of solutions to equations governing a simplified subchannel model for reactor hydrodynamics. The model describes time-independent flow of an incompressible fluid in two parallel, interconnected channels, subject to axial and lateral pressure drops defined by a Darcy friction factor. The phase portrait for the system of ordinary differential equations is presented, a solution to a boundary-value problem describing flow blockage is discussed, and the effect of the qualitative behavior of solutions on their numerical approximation is examined. The study was undertaken to determine the cause of numerical difficulty in approximating solutions to problems.

31621 **(EPRI-NP—2868) Personal cooling in nuclear power stations. Final report.** Kamon, E. (Pennsylvania State Univ., University Park (USA). Noll Lab. for Human Performance Research). Mar 1983. 83p. NTIS, PC A05/MF A01. Order Number DE83901973.

Two approaches to personal, non-restrictive cooling of workers exposed to high-temperature work environments in nuclear power plants were evaluated. Both approaches involved a cooling garment designed to be worn under the protective clothing donned in penetration into radiation areas. One garmet was developed to cool by direct body contact with small packets of frozen water enclosed in the pockets of a shirt. The other garmets cooled by circulating a cooled liquid through capillaries in a vest and head cap (System A) or a vest (System B). Testing was conducted in a laboratory simulation of high ambient temperature (55°C) and moderate metabolic heat production (200 to 300 kcal/h). Exposure time without cooling (control) was 52 minutes (Group 1) for the workloads demanding 200 kcal/h (48 minutes for Group 2). A long garmet with 7.2 kg of frozen water (LFWG) increased mean exposure time over the control by 242% (163% for the same garmet with 6.2 kg of frozen water). A short-version garmet with 3.8 kg of frozen water (SFWG) increased the stay time by 115%. The circulating-liquid garmets increased mean exposure time 35% (System A) and 27% (System B) over the control. In field observation, the LFWG with 6.2 kg of frozen water improved stay time by 125%.

2101 Power Reactors, Non-breeding, Light-water Moderated, Boiling Water Cooled

REFER ALSO TO CITATION(S) 31662, 31664, 31666, 31667, 31677, 31708, 31715, 31716, 31720, 31726, 31729, 31762, 31765, 31767, 31769, 31773, 31777, 31781

31622 **(EGG-EE—6220) Preliminary electrical-signal-isolation device: evaluation plan.** Morrison, J.L.; Nielsen, J.R.; Parfitt, K.S.; Rohrdanz, R.R. (EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 49p. NTIS, PC A03/MF A01. Order Number DE83012128.

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Concern exists related to the adequacy of the signal isolators in use or proposed for use in safety systems in commercial nuclear power plants. The concern is related to the ability of the signal isolators to perform their safety functions. This preliminary evaluation plan presents an examination methodology for evaluating electrical-signal isolators. The plan addresses factors related to safety, including compliance to the manufacturer's applicable safety-related performance specifications, compliance to applicable safety standards the manufacturer advertises his isolator will meet, compliance to Interim Related Criteria for Signal Isolation Devices Used in Commercial Nuclear Power Plants, and problems identified by operational history. Based on these factors potential test candidates are identified, general tests are presented, and the test equipment needed is listed.

31623 **(EPRI-NP—552) Core design and operating data for Quad Cities 1 Cycle 3.** Larsen, N.H. (General Electric Co., San Jose, CA (USA). Nuclear Energy Systems Div.). Mar 1983. 78p. NTIS, PC A05/MF A01. Order Number DE83901934.

This report contains the design and operating data needed to define the fuel characteristics and reactor operation characteristics for Cycle 3 of the Quad Cities 1 reactor. The purpose is to provide reference quality data for use in the qualification of reactor core analysis methods and to provide the basis for the assessment of the irradiation environment of the plutonium recycle assemblies present. The design data include fuel assembly description, core component arrangements, and core loading patterns. Hydraulic characteristics of the assemblies and the inlet orifices are also provided. Operating data are compiled for steadystate points during Cycle 3. Each state point includes core average exposure, thermal power, pressure, flux, inlet subcooling, control configuration, and axial in-core detector readings.

31624 (EPRI-NP—2792-CCM) SIMULATE-E: a nodal core-analysis program for light-water reactors. Computer code user's manual. Ver Planck, D.M.; Cobb, W.R.; Borland, R.S.; Versteegen, P.L. (Yankee Atomic Electric Co., Framingham, MA (USA); Science Applications, Inc., Marietta, GA (USA)). Mar 1983. 380p. NTIS, PC A17/MF A01. Order Number DE83901940.

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This report contains the methods descriptions and user's manual for the light-water reactor nodal core-analysis computer program, SIMULATE-E. SIMULATE yields the distribution of fission power within the core in three-dimensional detail while including the significant effects of hydraulics, control systems and fuel depletion on the macroscopic cross sections. All calculations solve for volume average values using a nodalization of the core volume which is limited to equal sized nodes, 10 to 20 centimeters on each side. Several variants of conventional coarse mesh diffusion theory are available as options. The user should expect the code to predict a three-dimensional power distribution showing all of the features of the measured distribution; accuracy should be sufficient to enable effective detailed decision making by the utility staff. Substantial numbers of processing options and favorable benchmarking experience enable effective core follow, core design and licensing analyses for BWRs and PWRs.

31625 (EPRI-NP—2901) Manual Analog Call Confirmer production prototypes. Final report. Frey, D.; Abrams, B.S. (Zeger-Abrams, Inc., Glenside, PA (USA)). Mar 1983. 66p. NTIS, PC A04/MF A01. Order Number DE83901949.

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This report documents the results of a project to design the production prototype models of the Manual Analog Call Confirmer (MACC), a portable electronic instrument to aid ultrasonic inspection of austenitic steel pipes subject to intergranular stress-corrosion cracking. The report presents a physical description of the MACC design, electrical schematics with accompanying text, interface requirements, and the theory of operation underlying the design. The report also covers the design of a laboratory model of a Feature Storage and Display Unit (FSDU), designed for test purposes as an adjunct to an earlier MACC model to enhance its performance.

31626 (EPRI-NP—2905) SPEAR-BETA fuel-performance code system: fission-gas-release module. Final report. Christensen, R. (Entropy Ltd., Lincoln, MA (USA)). Mar 1983. 48p. NTIS, PC A03/MF A01. Order Number DE83901629.

The original SPEAR-BETA general description manual covers both mechanistic and statistical models for fuel reliability, but only mechanistic modeling of fission gas release. This addendum covers the SPEAR-BETA statistical model for fission gas release.

31627 (EPRI-NP—2910) Feasibility study: a new cable-tray hanger concept for nuclear power plants. Final report. Dixon, M.W.; Pearce, B.K.; Jackson, J.E.; Bourne, F.R. (Duke Power Co., Charlotte, NC (USA); Clemson Univ., SC (USA). Coll. of Engineering). Mar 1983. 113p. NTIS, PC A06/MF A01. Order Number DE83901950.

This study partially assessed the feasibility of using flexible connectors in Class 1E systems to attach cable trays to their stiff hanger systems. Using finite-element, classical analytical, and experimental studies, it was found that a flexible connector with appropriate stiffness and damping characteristics could be used to isolate trays from hanger vibration and significantly reduce hanger loads during seismic events if the connectors could be adequately tuned to account for system variables. Finite-element techniques were used to select a flexible connector for a specified base hanger system. Tests were conducted on one-third-scale models to establish values for some of the parameters and to partially verify the numerical and analytical methods. Calculations were then performed using the dimensions of the base hanger system.

31628 (EPRI-NP—2911) Evaluation and modification of COMETHE III-J. Final report. Lindquist, K.; Henson, J.; Santucci, J. (Stoller (S.M.) Corp., New York (USA)). Mar 1983. 226p. NTIS, PC A11/MF A01. Order Number DE83901994.

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The predictions of the COMETHE III-J fuel performance code, as modified by EPRI and subsequently by the S.M. Stoller Corporation were compared with experimental data from well characterized fuel rod performance. The comparison was made for the rods analyzed in EPRI's RP 397 program (AECL, ELP, Halden, Maine Yankee) and additional rods from Calvert Cliffs, Oconee, Oyster Creek and Inter Ramp. The major conclusion of the evaluation was that for current LWR fuel types, the predictions of both COMETHE III-J and COMETHE III-J Modified show reasonable agreement with the experimental data. However, this conclusion must be qualified by the fact that some of the validation data were previously used in the code modification process. Comparing the two versions over the entire data set, predictions of fission gas release and temperature are approximately equivalent. Modified III-J tends to give better prediction of clad creep strain.

31629 (EPRI-NP—2936-SY-Vol.1) High-temperature filtration measurements at the Isar BWR Plant. Volume 1. Summary. Final report. Henzel, N.; Meier, M.; Greger, G.U. (Kraftwerk Union A.G., Erlangen (Germany, F.R.)). Mar 1983. 32p. NTIS, PC A03/MF A01. Order Number DE83901931.

This report details results of an analytical program used to assess the performance of an electromagnetic filter at the Isar Nuclear Power Station (KKI) in the Federal Republic of Germany. This installation is the first full-scale (6100 gpm) high-temperature filtration system operating at a nuclear power plant. Performance was characterized for the application of processing high-pressure drains at a BWR. Effects of magnetic field variations and startup/shutdown transients also were tested. Characteristics of the corrosion products were investigated, e.g., particle size, species, isotopic and chemical composition. The study shows that with proper operating conditions and careful selection of the point of application reasonable crud removal efficiencies can be achieved.

31630 (EPRI-NP—2939) Assessment of SPEAR-FCODE-BETA for fuel licensing. Final report. Bradley, E.R.; Lanning, D.D.; Fiero, I.B.; Freeburn, H.R.; Garde, A.M.; Krammen, M.A.; Rotondo, P.L. (Pacific Northwest Lab., Richland, WA (USA); Combustion Engineering, Inc., Windsor, CT (USA)). Mar 1983. Contract AC06-76RL01830. 66p. NTIS, PC A04/MF A01. Order Number DE83011218.

The EPRI FCODE-BETA fuel performance code is the mechanistic model portion for the SPEAR-BETA fuel reliability code, which was developed for EPRI by Entropy Limited. FCODE-BETA was assessed by Battelle, Pacific Northwest Laboratories, and Combustion Engineering, Inc., for adequacy in simulating fuel performance in fuel licensing proceedings. The assessment included a detailed review of those thermal and mechanical performance models of greatest importance to fuel licensing, including fission gas release, fuel temperatures, and cladding uniform strain. It was concluded that the code is inadequate for licensing calculations in its present form. Recommendations for modeling and usability improvements are made.

31631 (EPRI-NP—2970) Residual stresses in LP turbine discs. Final report. Robinson, C.T.; Leverant, G.R. (Southwest Research Inst., San Antonio, TX (USA)). Mar 1983. 39p. NTIS, PC A03/MF A01. Order Number DE83901954.

Bulk and surface residual stresses were determined for low-pressure turbine discs that had been retired from service. Bulk stresses were measured on four discs by the sectioning method and surface stresses on nine discs by the X-ray diffraction technique. Significant bulk tangential (hoop) stresses (20 to 30 ksi) were found in two discs. These stresses were compressive at the bore and tensile at the rim. Surface stresses varied considerably from disc to disc and at various locations on the same disc. The stresses ranged from -87 to +28 ksi.

31632 **(IKE—6-132) Calculation of the axial void fraction in BWR fuel elements with regard to various models for subcooled boiling.** Erhard, W.D.; Elzmann, J. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Jul 1980. 64p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750034.

A new model of Maroti for subcooled boiling was implemented into an existing one-dimensional thermohydraulic code. The resulting distribution of void in the subcooled boiling region were compared with the standard model of Levy. Effects of the void volume fraction in this region on the region of bulk boiling were investigated. The results were compared with experimental data.

31633 **(KFK—3408) Extraction of eigenfrequencies, mode shapes and critical damping ratios of HDR core barrel mockup from step relaxation response signals measures in the snapback test series V59.** Eberle, F.; Kadlec, J. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung). Oct 1982. 84p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750241.

The report deals with the experimental analysis of the core barrel mockup installed in the reactor pressure vessel of the HDR-facility at Karlstein on the river Main. The eigenfrequencies, the mode shapes and the damping ratios of the core barrel were extracted from the set of simulatneously measured relaxation response signals. The response was achieved via a snapback process, e.g. sudden release of the core barrel previously loaded with a concentrated load by means of a hydraulic deflection device. For the extraction of modal characteristics from the transient acceleration and displacement signals the computer code EVA, especially developed for this purpose, was used. A total number of 76 eigenmodes was identified - 32 eigenmodes of the core barrel/water charge coupled system and 44 eigenmodes of the core barrel without water charge. Several of these eigenmodes are multiple modes (preferably doublets) with equal axial and circumferential order but different eigenfrequencies, damping ratios and orientations in space. The smallest identified eigenfrequency difference of one doublet illustrating the good resolution capability of the procedure equals 1.5%. The procedure does not impose any restrictions on the nature of the transient excitation and, therefore can be used in such application tasks where conventional procedures of experimental modal analysis are not practicable, e.g. under hostile environmental conditions and in badly accessible systems. Experience acquired shows that the procedure can be well applied also in case of slightly non-linear systems. The experimental setup used, the mathematical background of the computer code EVA as well as the results obtained are described in detail.

31634 **(NUREG—0969) Report of the NRC Evaluation Team on the quality of construction at the Zimmer Nuclear Power Station.** (Nuclear Regulatory Commission, Washington, DC (USA)). Apr 1983. 392p. NTIS, PC A17/MF A01 - GPO. Order Number DE83901794.

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This NRC Evaluation Team report documents the results, conclusions, and recommendations regarding the independent evaluation of the quality of construction at the Zimmer Nuclear Power Station conducted during the period of January 24, 1983 through March 4, 1983. The evaluation focused on hardware and utilized independent measurements and confirmatory examinations. This evaluation is but one element of an NRC action plan which was developed to provide a systematic approach to resolve NRC's concerns related to the quality of hardware and management controls at the Zimmer Nuclear Power Station.

31635 **(PB—83-911501) Nuclear power program information and data. Update, October-December 1982.** (USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Converter Reactor Deployment). Feb 1983. 108p. (DOE/NE—0048/1). NTIS, PC A06/MF A01. Order Number DE83010620.

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Compiled data are presented concerning the status of US nuclear power plants; operating and maintenance activities associated with PWR and BWR type reactors; worldwide plans for the development of nuclear power plants; cost of US nuclear power plants; US electric power consumption and power generation data; and spent fuel and radioactive waste inventories and projection. This is a quarterly publication that will be available from NTIS at an annual subscription rate of $40 (domestic), $80 (foreign) and at a single-copy price of $13.

2102 Power Reactors, Non-breeding, Light-water Moderated, Non-boiling Water Cooled

REFER ALSO TO CITATION(S) 31265, 31622, 31624, 31626, 31627, 31628, 31630, 31631, 31635, 31662, 31664, 31666, 31669, 31692, 31693, 31694, 31695, 31696, 31697, 31698, 31699, 31700, 31701, 31702, 31703, 31704, 31705, 31706, 31707, 31713, 31715, 31718, 31719, 31720, 31726, 31729, 31730, 31731, 31732, 31733, 31734, 31735, 31736, 31737, 31742, 31746, 31760, 31762, 31763, 31764, 31767, 31769, 31771, 31773, 31775, 31776, 31777, 31779, 31781

31636 **(AEEW-R—779) Dryout experiments in a 25-rod 12 long bundle under PWR and other conditions.** Little, R.B.; Obertelli, J.D.; Robinson, C.H. (UKAEA Atomic Energy Establishment, Winfrith). Aug 1972. 142p. NTIS (US Sales Only), PC A07/MF A01. Order Number DE83700378.

Dryout tests were performed on heater clusters of 25 rods in a square array in a high pressure water rig, to determine dryout criteria under forced convection. In order to ensure that dryout heat fluxes were not influenced by the cold wall, the centre group of nine highly rated heater rods was surrounded by a guard ring of sixteen less highly rated ones. A nominally uniform axial heat flux distribution was used, and a range of pressures was investigated.

31637 **(CEA-CONF—6139) Stresses imposed on fuels by changes in power: problems posed and qualification tests.** Traccucci, R.; Marin, J.F. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Dec 1981. 16p. (In French). (CONF-811264—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700379.

From SFEN meeting on power station control to meet the electric network requirements; Paris, France (8 Dec 1981).

The repercussions of the operating methods considered for power stations on the stresses actually undergone by the fuel elements during their time in the reactor can be analyzed on the physical and metallurgical phenomenon level: creep, plastic deformation, fatigue, corrosion under stress, found in the cladding materials. The various studies are presented, tests and examinations already carried out or in hand and, in particular, those specific to the studies on fatigue and creep damage of cladding, tests on irradiated and cycled rods from the first qualification irradiation campaign of the CAP. From the partial results and the examinations carried out so far, it can be concluded that the behaviour of the reference fuel rods subjected to load changes under irradiation is excellent.

31638 **(CEA-CONF—6183) Corrosion products in PWR cooling circuits.** Darras, R. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Dec 1981. 8p. (In French). (CONF-811265—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700380.

From Workshop on nuclear corrosion; Erlangen, F.R. Germany (10 Dec 1981).

Mention is first made of the characteristics of the primary and secondary circuits of pressurized water nuclear power stations, particularly with respect to chemical specifications. The materials used in these systems have been selected so that their overall low corrosion does not cause damage with respect to the integrity of the various components throughout the entire life of the reactor. However, the conjunction of several unfavourable circumstances, not originally foreseen, can cause the faith in this "good choice" to be proved wrong. Overall corrosion can therefore have a destructive character in certain particular cases but, even when the rate is slight, it is the source of corrosion products which are responsible for the pollution of the water in the systems, insufficiently opposed by the conventional purification methods.

31639 (CEA-N—2274) Boolean optimization method for reloading a nuclear reactor. Misse Nseke, T. (Lille-2 Univ., 59 (France); CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1982. 91p. (In French). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83700381.

We attempt to solve the problem of optimal reloading of fuel assemblies in a PWR, without any assumption on the fuel nature. Any loading is marked by n^2 boolean variables usub(ij). The state of the reactor is characterized by his Ksub(eff) and the related power distribution. The resulting non-linear allocation problems are solved throught mathematical programming technics combining the simplex algorithm and an extension of the Balas-Geoffrion's one. Some optimal solutions are given for PWR with assemblies of different enrichment.

31640 (DOE/NV/10250—6) Histories of spent-nuclear-fuel assemblies while at the E-MAD facility, December 1978-September 1982. Dobbins, J.C. (Westinghouse Electric Corp., Mercury, NV (USA). Advanced Energy Systems Div.). Jan 1983. Contract AC08-82NV10250. 140p. NTIS, PC A07/MF A01. Order Number DE83011335.

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This report documents the handling and storage histories of seventeen spent pressurized water reactor (PWR) fuel assemblies while they have been at the Engine Maintenance, Assembly and Disassembly (E-MAD) facility on the Nevada Test Site (NTS) through September 30, 1982. This report also presents thermal histories of the fuel assemblies, including predictions of peak clad temperatures.

31641 (EPRI-NP—2944) Elastic-stress analysis of small-radius U-bend steam-generator tubes. Final report. Cloud, R.; Leung, J.; Loey, H. (Cloud (Robert L.) Associates, Inc., Berkeley, CA (USA)). Mar 1983. 91p. NTIS, PC A05/MF A01. Order Number DE83901941.

Detailed finite-element analyses have been performed to determine the role of elastic stresses in cracking of steam-generator U-bend tubes. These analyses considered the effect of simulated typical operating conditions on tubes with local geometry variations and anomalies. A finite-element model incorporating the geometry of an actual tube was developed and analysis results were compared to those of the idealized tubes. The results of each of these analyses were compared to analysis results for an idealized uniformly circular tube. Specific geometrical factors and loading conditions which affect the stresses were identified and their significance discussed. Finally, stress results were correlated to locations of actual cracking in tubes removed from power plant service.

31642 (EPRI-NP—2967) Evaluation of surrogate boilers for steam generators. Final report. Bell, M.J.; Kassen, W.R.; Smith, L.A.; Sawochka, S.G. (NWT Corp., San Jose, CA (USA)). Mar 1983. 53p. NTIS, PC A04/MF A01. Order Number DE83901981.

Corrosion in PWR systems is a continuing problem that can result in significant expenditures for inspection, repair, and replacement of steam generators as well as for power replacement during outages. Model boilers operated in parallel to the steam generator may provide a useful tool for monitoring and studying steam generator corrosion and corrosion prevention processes. The potential benefits of such boilers as well as several conceptual boiler design alternatives are described, and approximate costs for fabrication and operation of such systems are presented.

31643 (EPRI-NP—2969) Hydrazine usage for corrosion control in PWR plants with powdered-resin-condensate polishers. Final report. Barkich, J.L.; Battaglia, P.J. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Nuclear Technology Div.). Mar 1983. 36p. NTIS, PC A03/MF A01. Order Number DE83901947.

The objective of this project was to obtain the data necessary to determine the optimum injection point and amount of hydrazine to be used for oxygen control in PWR units with condensate polishing demineralizers. An additional objective was to demonstrate that the condensate polisher can be used as a means to reduce the oxygen concentration in the condensate when a sufficient excess concentration of hydrazine (over the oxygen) concentration is carried over with the main steam into the condensers. Testing was performed at North Anna Unit 2 which employs powdered resin-type condensate polishing equipment. Testing was also scheduled to be performed at Ginna and Sequoyah Unit 1 plants; however, because of an unscheduled shutdown at Ginna and inability to control hydrazine dosage at Sequoyah, these tests were not performed.

31644 (INIS-mf—7498, pp vp) Purpose and main design features of a freon flow loop to simulate a nuclear power plant. Sharon, A. (Ben-Gurion Univ. of the Negev, Beersheba (Israel). Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31645 (KFK—3380) Analysis of Am and a recovery for it in the pressurized water reactor fuel cycle. Ganser, B. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Radiochemie). Jul 1982. 93p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750050.

Thesis. Submitted to Karlsruhe Univ., Germany, F.R.

In order to estimate the levels of Am in the nuclear fuel cycle, calculations of the Am-concentrations in pressurized water reactors have been carried out using the computer program KORIGEN and the results compared with experimental values. For the experimental determinations, mass spectrometric isotope dilution analysis were made on selected samples. Dihexyl-N,N-diethylcarbamylmethylenephosphonate (DHDECMP), which is capable of the extraction of Am from high active waste during reprocessing, was compared with six further CMP's having larger aliphatic chains and varying degrees of isomerism. The dependence of the extraction coefficient on the nitric acid strength was determined. The extraction coefficient of a selected lanthanide (Pr) was measured in 3 M HNO_3 for each CMP. The dependence of the extraction coefficient on the lanthanide concentration in the aqueous phase was determined for DHDECMP. A pure La-DHDECMP compound was isolated and investigated using IR and NMR spectroscopy. The solubilities of the CMP's in 0.1 M and 3.0 M HNO_3 were measured. For the first time, two selected CMP's were used to extract high activity waste solutions from mixed-oxide fuels and the distribution coefficients fro Am, Cm and Cs at the extraction and the reextraction from the organic phase were determined. The effect of the radiolysis of the extracting agents by extracted radionuclides was investigated.

31646 (NUREG/CR—2780) Evaluation of system requirements and standards development for thermal annealing of reactor pressure vessels. Progress report, March-September 1982. Server, W.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 49p. (EGG-FM—6174). NTIS, PC A03/MF A01 - GPO $4.75. Order Number DE83010651.

The material property data on thermal annealing of reactor-pressure-vessel steels have been reviewed. The most-critical materials are high copper welds; the data indicate that close to full recovery of Charpy V-notch properties can be realized by annealing at 850°F for 1 week (168 hours). However, the variability and sparcity of annealing recovery data dictate appropriate surveillance and experimental test programs. Of particular concern are the actual fracture-toughness changes and the differences between test- and power-reactor conditions. A survey of pressurized-water-reactor vendors, architect engineers, and consultants has been performed to assess the feasibility of performing a thermal-annealing cycle to restore the beltline material properties to their original state. This survey also addressed the issue of whether or not an actual annealing demonstration should be performed. It is the consensus view of the industry that in-situ reactor-vessel annealing can be done, but several areas still need to be studied and the American Society of Mechanical Engineers' Boiler and Pressure Vessel Code guidelines need to be defined.

31647 **(NUREG/CR—3176) Crack growth evaluation for small cracks in reactor-coolant piping.** Simonen, F.A.; Mayfield, M.E.; Forte, T.P.; Jones, D. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 67p. (PNL—4642). NTIS (US Sales Only), PC A04/MF A01 - GPO $5.00. Order Number DE83011201.

This report describes an evaluation of fatigue crack growth in Pressurized Water Reactor (PWR) piping. The results provide supporting data to a research program for the US Nuclear Regulatory Commission (NRC) at the Pacific Northwest Laboratory which has the objective of evaluating the effectiveness and reliability of inservice inspection of primary coolant piping. The crack growth calculations described here were performed after a review and refinement of input parameters to a previous study entitled Cold Leg Integrity Evaluation. Less conservative estimates of initial flaw size, crack growth rate curves, and stress transients resulted in a significant increase in predicted life for flawed piping over the results of the original study. Except for the charging inlet nozzle analysis, all locations of postulated cracking had predicted lives well in excess of the 40-year design life. A detailed comparison is made with published probabilistic fracture mechanics calculations.

2103 Power Reactors, Non-breeding, Graphite Moderated

REFER ALSO TO CITATION(S) 31662, 31666, 32026

31648 **(CEGB-RD/B—5162N81) Compilation of results from heat transfer and pressure drop experiments using artificially roughened surfaces in annular channels.** Firth, R.J. (Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.). Oct 1981. 16p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700827.

Data and correlations which form part of the basis for a collaborative project with Kernforschungszentrum Karlsruhe (KfK) are presented. The collaboration was aimed towards comparing the thermal performance of the different types of artificially roughened surfaces which have been developed in the gas-cooled reactor research programmes. A compilation of the data from the UK Advanced Gas-cooled Reactor (AGR) research programme which were used in the comparison is given and the results of the analysis of these data using methods which have been developed as part of the AGR research programme are described. For completeness the results of an analysis of the KfK data are also included.

31649 **(GA-A—17037) New small HTGR power plant concept with inherently safe features - an engineering and economic challenge.** McDonald, C.F.; Sonn, D.L. (GA Technologies, Inc., San Diego, CA (USA)). 1983. Contract AT03-76SF70046. 25p. (CONF-830446—2). NTIS, PC A02/MF A01. Order Number DE83010932.

From American Power conference; Chicago, IL, USA (18 Apr 1983).

Studies are in a very early design stage to establish a modular concept High-Temperature Gas-Cooled Reactor (HTGR) plant of about 100-MW(e) size to meet the special needs of small energy users in the industrialized and developing nations. The basic approach is to design a small system in which, even under the extreme conditions of loss of reactor pressure and loss of forced core cooling, the temperature would remain low enough so that the fuel would retain essentially all the fission products and the owner's investment would not be jeopardized. To realize economic goals, the designer faces the challenge of providing a standardized nuclear heat source, relying on a high percentage of factory fabrication to reduce site construction time, and keeping the system simple. While the proposed nuclear plant concept embodies new features, there is a large technology base to draw upon for the design of a small HTGR.

2104 Power Reactors, Non-breeding, Otherwise Moderated Or Unmoderated

REFER ALSO TO CITATION(S) 31672, 31689, 31712, 31737, 31740, 31741

31650 (INIS-mf—7499, pp vp) **Derived working limits and their applications.** Minarik, F.; Fueloep, M.; Galan, P. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)). 1980. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

2105 Power Reactors, Breeding

REFER ALSO TO CITATION(S) 31253, 31255, 31671, 31714, 31721, 31722, 31723, 31724, 31727, 31728, 31738, 31757, 31758, 31759, 31768, 31772

31651 **(CONF-820601—31) Scoping calculations for design and analysis of large reactor vessels for liquid-metal fast breeder reactor (LMFBR) plants.** Fiala, C.; Kulak, R.F.; Ma, D.C.; Pan, Y.C.; Seidensticker, R.W.; Wang, C.Y.; Zeuch, W.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 27p. NTIS, PC A03/MF A01. Order Number DE83010562.

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

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Reactor vessels for commercial-sized LMFBR plants are quite large - ranging 40 to 70 ft in diameter and 50 to 70 ft in overall depth. These stainless steel vessels contain liquid sodium at relatively low pressures, but at high temperatures. The resulting thin-walled vessels present the structural designer and analyst with special problems, particularly in providing a balanced design to accommodate seismic loads, design basis accident loads, and thermal loadings. A comprehensive set of scoping calculations - though preliminary in detail and depth of design - provides substantial guidance to the vessel designer for subsequent design iterations. Emphasis is placed on the analysis of the large-diameter top closure of the vessel - the deck structure.

31652 **(CONF-821103—88) Remote waste handling at the Hot Fuel Examination Facility.** Vaughn, M.E. (Argonne National Lab., Idaho Falls, ID (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83010740.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

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Radioactive solid wastes, some of which are combustible, are generated during disassembly and examination of irradiated fast-reactor fuel and material experiments at the Hot Fuel Examination Facility (HFEF). These wastes are remotely segregated and packaged in doubly contained, high-integrity, clean, retrievable waste packages for shipment to the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering Laboratory (INEL). This paper describes the equipment and techniques used to perform these operations.

31653 **(CONF-830418—2-Draft) In-reactor uniaxial fracture strain of 20%-cold-worked type 316 stainless steel.** Grossbeck, M.L.; Bloom, E.E. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 4p. NTIS, PC A02/MF A01. Order Number DE83012071.

From International conference on dimensional stability and mechanical behavior of irradiated metals and alloys; Brighton, UK (11 Apr 1983).

In-reactor creep strain and fracture strain were determined for type 316 stainless steel at 430, 550, and 625°C. Specimens were irradiated in EBR-II to a fluence of 5×10^{26} n/m² ($E > 0.1$ MeV). Strain rates of 10^{-10} to 10^{-9} S^{-1} were achieved by using a swelling driven device to apply stress. Fracture strains of 6% at 550°C and 1% at 625°C were observed. All fractures were intergranular as expected for such low strain rates.

31654 (CONF-830607—6) Nonlinear fluid/structure interaction relating a rupture-disc pressure-relief device. Hsieh, B.J.; Kot, C.A.; Shin, Y.W.; Youngdahl, C.K. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83010737.

From American Society of Mechanical Engineers pressure vessel and piping conference; Portland, OR, USA (19 Jun 1983).

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Rupture disc assemblies are used in piping network systems as a pressure-relief device. The reverse-buckling type is chosen for application in a liquid metal fast breeder reactor. This assembly is used successfully in systems in which the fluid is highly compressible, such as air; the opening up of the disc by the knife setup is complete. However, this is not true for a liquid system; it had been observed experimentally that the disc may open up only partially or not at all. Therefore, to realistically understand and represent a rupture disc assembly in a liquid environment, the fluid-structure interactions between the liquid medium and the disc assembly must be considered. The methods for analyzing the fluid and the disc and the mechanism interconnecting them are presented. The fluid is allowed to cavitate through a column-cavitation model and the disc is allowed to become plastically deformed through the classic Von Mises' yield criteria, when necessary.

31655 (CRBRP-ARD—0322(Summ.)) Clinch River Breeder Reactor Plant Project. Summary edition. 1982 Technical progress report, October 1981-September 1982. (Westinghouse Electric Corp., Madison, PA (USA). Advanced Reactors Div.). 1982. Contract AC15-76CL50003. 25p. NTIS, PC A02/MF A01. Order Number DE83007260.

Information is presented concerning site preparation and component fabrication and performance testing.

31656 (DOE/ET/37240—92TR(Rev.1)) Simple LMFBR axial-flow friction-factor correlation. Chan, Y.N.; Todreas, N.E. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering). Dec 1982. Contract AC02-76ET37240. 112p. NTIS MF A01. Order Number DE83011252.

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Complicated LMFBR axial lead-length averaged friction-factor correlations are reduced to an easy, ready-to-use function of bundle Reynolds number for wire-wrapped bundles. The function together with the power curves to calculate the associated constants are incorporated in a computer preprocessor, EZFRIC. The constants required for the calculation of the subchannels and bundle friction factors are derived and correlated into power curves of geometrical parameters. A computer program, FRIC, which can alternatively be used to accurately calculate these constants is also included. The accurate values of the constants and the corresponding values predicted by the power curves and percentage error of prediction are tabulated for a wide variety of geometries of interest.

31657 (DOE/ET/37240—102TR) Directions for further development of the HEATRAN code: definition of a new computational code. Cheng, S.K.; Todreas, N.E. (Massachusetts Inst. of Tech., Cambridge (USA)). Dec 1982. Contract AC02-76ET37240. 23p. NTIS, PC A02/MF A01. Order Number DE83009490.

HEATRAN is a three-dimension distributed parameter code developed at MIT under the DOE's Mixing Project. The ultimate objective of this code is to calculate the detailed local subchannel conditions, namely, coolant temperature and velocity distributions as well as clad surface temperature distribution, in a wire-wrapped LMFBR subassembly. Currently, the code uses an interior circular cell within the subassembly as the computational domain. A rotating coordinate system and an annular sector have been used to model the wire of the central pin, while discrete flow blcokages have been applied to represent the wires of the adjacent pins.

31658 (KFK—3389) Verification of the calculation methods for the tight reactor lattices of advanced pressurized water reactors (APWR). Berger, H.D.; Schatz, M.; Rowe, A.W.; Broeders, C. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Schneller Brueter). Oct 1982. 92p. (In German). (IFRR-K—8212). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750240.

With a view to a better utilization of the uranium resources investigations of reactors with tight light-water-cooled lattices and a high conversion ratio are of interest (advanced pressurized water reactor, APWR). Because of the large deviations of the neutron energy spectra of APWR-lattices compared to thermal and fast reactors, a number of available computer codes and data libraries have been verified and compared. The following available experimental data have been investigated: (a) tight light-water moderated UO_2-lattices from the 'High Conversion Critical Experiments Program' in ZPR-7 in Argonne (USA), (b) light-water moderated mix-oxyde-lattices from the 'Plutonium Utilization Program' at Battelle Northwest (USA) and from the 'Saxton Plutonium Program' at Westinghouse (USA). These lattices are less tight and contain less plutonium compared to the first design for a APWR-core. Further comparisons have been carried out for a reference-design of a homogeneous APWR-core, proposed by the TU-Braunschweig, and for a typical LMFBR-core from a NEACRP-benchmark. Procedures for the calculation of thermal reactors and modified procedures for the calculation of fast reactors have been used.

31659 (WAPD-TM—1411) Stress-corrosion cracking and surface-pitting tests of NiCrFe alloy bolts (LWBR development program). Keller, K.L. (Bettis Atomic Power Lab., West Mifflin, PA (USA)). Feb 1983. Contract AC11-76PN00014. 82p. NTIS, PC A05/MF A01. Order Number DE83011080.

Accelerated corrosion tests confirmed the adequate resistance to stress corrosion cracking (SCC) of the specific heats of NiCrFe X-750 and NiCrFe 600 used as bolts in the LWBR. SCC acceleration was achieved by running autoclave corrosion tests at 680°F (well above the LWBR core operating temperatures of approximately 525°F to 560°F). Component stress levels were representative of maximum service stresses. No specimens from heats of either alloy suffered SCC.

31660 (WAPD-TM—1514) Fracture-mechanics analysis of iodine stress-corrosion crack propagation in zircaloy tubing used to clad oxide-pellet fuel rods. LWBR Development Program. Crescimanno, P.J.; Campbell, W.R.; Goldberg, I. (Bettis Atomic Power Lab., West Mifflin, PA (USA)). Apr 1983. Contract AC11-76PN00014. 49p. NTIS, PC A03/MF A01. Order Number DE83011407.

A fracture mechanics model is presented for analysis of iodine induced stress corrosion crack growth in Zircaloy tubing. The model utilizes a power law to relate crack velocity to stress intensity factor, a hyperbolic tangent function for the influence of iodine concentration, and an exponential function for the influence of temperature and material strength. Comparisons of predicted to measured failure times show that predicted failure times are within a factor of two of the measured failure times for a majority of the specimens considered.

31661 (NE-M—2-3T-Rev.(2-83)) Carbon and alloy steel welding fittings (ASME SA-234 with additional requirements). (Department of Energy, Washington, DC (USA). Office of Nuclear Energy Programs). Feb 1983. 12p. Participants in the Spec. NSMC Dist. Program. Others request from ORNL, NSMC.

2107 Regulation And Licensing

REFER ALSO TO CITATION(S) 31766

31662 **(NUREG—0020-Vol.7-No.1) Licensed operating reactors. Status summary report data as of December 31, 1982.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Jan 1983. 392p. NTIS, PC A17/MF A01 - GPO. Order Number DE83901710.

The US Nuclear Regulatory Commission's monthly LICENSED OPERATING REACTORS Status Summary Report provides data on the operation of nuclear units as timely and accurately as possible. This information is collected by the Office of Management and Program Analysis, from the Headquarters Staff of NRC's Office of Inspection and Enforcement, from NRC's Regional Offices, and from utilities. This report is divided into three sections: the first contains monthly highlights and statistics for commercial operating units, and errata from previously reported data; the second is a compilation of detailed information on each unit, provided by NRC Regional Offices, IE Headquarters and the Utilities; and the third section is an appendix for miscellaneous information such as spent fuel storage capability, reactor years of experience and non-power reactors in the United States.

31663 **(NUREG—0040-Vol.7-No.1) Licensee contractor and vendor inspection status report. Quarterly report, January 1983-March 1983.** (Nuclear Regulatory Commission, Arlington, TX (USA). Region IV). Apr 1983. 281p. NTIS, PC A13/MF A01 - GPO. Order Number DE83901955.

A fundamental premise of the Nuclear Regulatory Commission's (NRC) nuclear facility licensing and inspection program is that a licensee is responsible for the proper construction and safe operation of nuclear power plants. The total government-industry system for the inspection of nuclear facilities has been designed to provide for multiple levels of inspection and verification. In implementing this multilayered approach, a licensee is responsible for developing a detailed quality assurance (QA) plan as part of his license application. This plan includes the QA programs of the licensee's contractors and vendors. The NRC reviews the licensee's and contractor's QA plans to determine that implementation of the proposed QA program would be satisfactory and responsive to NRC regulations. The White Book contains information normally used to establish a qualified suppliers list; however, the information contained in this document is not adequate nor is it intended to stand by itself as a basis for qualification of suppliers.

31664 **(NUREG—0485-Vol.5-No.3) Systematic evaluation program. Status summary report. Vol. 5, No. 3.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). 31 Mar 1983. 63p. NTIS, PC A04/MF A01 - GPO. Order Number DE83901645.

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Information is presented concerning safety assessments for the following reactors: Big Rock Point reactor; Dresden-1 reactor; Dresden-2 reactor; Ginna-1 reactor; Connecticut Yankee reactor; LACBWR reactor; Millstone-1 reactor; Oyster Creek-1 reactor; Palisades-1 reactor; San Onofre-1 reactor; and Rowe Yankee reactor.

31665 **(NUREG—0540-Vol.5-No.1) Title list of documents made publicly available, January 1-31, 1983. Vol. 5, No. 1.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Administration). Apr 1983. 579p. NTIS, PC A25/MF A01 - GPO. Order Number DE83901959.

The Title List of Documents Made Publicly Available is a monthly publication. It contains descriptions of the information received and generated by the US Nuclear Regulatory Commission (NRC). This information includes (1) docketed material associated with civilian nuclear power plants and other uses of radioactive materials and (2) nondocketed material received and generated by NRC pertinent to its role as a regulatory agency. As used here, docketed does not refer to Court dockets; it refers to the system by which NRC maintains its regulatory records. This series of documents is indexed by a Personal Author Index, a Corporate Source Index, and a Report Number Index.

31666 **(NUREG—0748) Operating reactors licensing actions summary. Vol. 3, No. 3.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Apr 1983. 314p. NTIS, PC A14/MF A01 - GPO. Order Number DE83901765.

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The operating reactors licensing actions summary is designed to provide the management of the Nuclear Regularory Commission (NRC) with an overview of licensing actions dealing with operating power and nonpower reactors. These reports utilize data collected from the Division of Licensing in the Office of Nuclear Reactor Regulation and are prepared by the Office of Management and Program Analysis. This summary report is published primarily for internal NRC use in managing the operating reactors licensing actions program.

31667 **(NUREG—0887-Suppl.-No.3) Safety evaluation report related to the operation of Perry Nuclear Power Plant, Units 1 and 2. Docket Nos. 50-440 and 50-441.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Apr 1983. 62p. NTIS, PC A04/MF A01 - GPO $5.00. Order Number DE83901728.

Supplement No. 3 to the Safety Evaluation Report on the application filed by the Cleveland Electric Illuminating Company on behalf of itself and as agent for the Duquesne Light Company, the Ohio Edison Company, the Pennsylvania Power Company, and the Toledo Edison Company (the Central Area Power Coordination Group or CAPCO), as applicants and owners, for a license to operate the Perry Nuclear Power Plant, Units 1 and 2 (Docket Nos. 50-440/441), has been prepared by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. The facility is located in Lake County, Ohio. This supplement reports the status of certain issues that had not been resolved at the time of publication of the Safety Evaluation Report and Supplement Nos. 1 and 2 to that report.

31668 **(NUREG—0940-Vol.2-No.1) Enforcement actions: significant actions resolved. Quarterly progress report, January-March 1983. Volume 2 No. 1.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Inspection and Enforcement). Apr 1983. 283p. NTIS, PC A13/MF A01 - GPO. Order Number DE83901712.

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This compilation summarizes significant enforcement actions that have been resolved during one quarterly period (January-March 1983) and includes copies of letters, notices, the licensees' response, and orders sent by the Nuclear Regulatory Commission to the licensee with respect to the enforcement action. It is anticipated that the information in this publication will be widely disseminated to managers and employees engaged in activities licensed by the NRC, in the interest of promoting public health and safety as well as common defense and security.

31669 **(NUREG—0972) Draft environmental statement related to the operation of Shearon Harris Nuclear Power Plant, Units 1 and 2. Docket Nos. STN 50-400 and STN 50-401.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Apr 1983. 220p. NTIS, PC A10/MF A01 - GPO. Order Number DE83901755.

This Draft Environmental Statement contains the second assessment of the environmental impact associated with the operation of the Shearon Harris Nuclear Power Plant, Units 1 and 2, pursuant to the National Environmental Policy Act of 1979 (NEPA) and 10 CFR 51, as amended, of the NRC regulations. This statement examines the environment, environmental consequences and mitigating actions, and environmental and economic benefits and costs. Land use and terrestrial and aquatic-ecological impacts will be small. Operational impacts to historic and archeological sites will be negligible. The effects of routine operations, energy transmission, and periodic maintenance of rights-of-way and transmission facilities should not jeopardize any populations of endangered or threatened species. No significant impacts are anticipated from normal operational releases of radioactivity. The risk of radiation exposure associated with accidental release of radioactivity is very low. The net

socio-economic effects of the project will be beneficial. The action called for is the issuance of an operating license for Shearon Harris PLant, Units 1 and 2.

31670 (NUREG/BR—0051) Power reactor events, September-October 1982. Volume 4. No. 6. Massaro, S.A. (ed.). (Nuclear Regulatory Commission, Washington, DC (USA). Office for Analysis and Evaluation of Operational Data). Apr 1983. 35p. NTIS, PC A03/MF A01 - GPO. Order Number DE83901957.

Power Reactor Events is a bi-monthly newsletter that compiles operating experience information about commercial nuclear power plants. This includes summaries of noteworthy events and listings and/or abstracts of USNRC and other documents that discuss safety-related or possible generic issues. It is intended to feed back some of the lessons learned from operational experience to the various plant personnel, i.e., managers, licensed reactor operators, training coordinators, and support personnel.

31671 (NE-F—6-5T-Rev.(3-83)) Welding and brazing qualifications (supplement to ASME Boiler and Pressure Vessel Code, Section IX). (Department of Energy, Washington, DC (USA). Office of Nuclear Energy Programs). Mar 1983. 58p. Participants in the Spec. NSMC Dist. Program. Others request from ORNL, NSMC.

2108 Economics

REFER ALSO TO CITATION(S) 31912, 31913

31672 (AECL—7516) Once-through thorium cycles in Candu reactors. Milgram, M.S. (Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.). Jan 1982. 40p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700373.

In once-through thorium cycles pure thorium fuel bundles can be irradiated conjointly with uranium fuel bundles in a CANDU reactor with parameters judiciously chosen such that the overall fuel cycle cost is competitive with other possibilities - notably low-enriched uranium. Uranium 233 can be created and stockpiled for possible future use with no imperative that it be used unless future conditions warrant, and a stockpile can be begun independently of the state of reprocessing technology. The existence and general properties of these cycles are discussed.

31673 (AEOI—129) Abstract of articles presented at the seminar of investigating the construction of nuclear power plant in Iran. Hariri, A.; Khonsari Moosavi, R.; Shoai-Naini, J.; Motamedi, M.A. (Atomic Energy Organization of Iran, Teheran). Jan 1982. 35p. (In Iranian). (CONF-8105194—Absts.). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700372.

From Seminar of investigating the construction of nuclear power plant in Iran; Isfahan, Iran (10 May 1981).

Under five subtitles papers had been presented to the seminar of investigating the construction of nuclear power plant held at Isfahan by Atomic Energy Organization of Iran (AEOI). 1.The necessity of constructing nuclear power plants in Iran with relation to the development of nuclear technology. 2.Seven articles survey the problem of fuel cycling and the potentiallity of AEOI in this field. 3. Four papers allocate to the technology of nuclear safety and radiation protection. 4.Three papers evaluate technical and scientific capabitities of AEOI for constructing nuclear power plants, and two paper about planning and training man power with an aim toward construction of nuclear power plants.

31674 (DOE/EIA—0392) Nuclear plant cancellations: causes, costs, and consequences. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Apr 1983. 135p. NTIS, PC A07/MF A01. Order Number DE83011614.

This study was commissioned in order to help quantify the effects of nuclear plant cancellations on the Nation's electricity prices. This report presents a historical overview of nuclear plant cancellations through 1982, the costs associated with those cancellations, and the reasons that the projects were terminated. A survey is presented of the precedents for regulatory treatment of the costs, the specific methods of cost recovery that were adopted, and the impacts of these decisions upon ratepayers, utility stockholders, and taxpayers. Finally, the report identifies a series of other nuclear plants that remain at risk of canellation in the future, principally as a result of similar demand, finance, or regulatory problems cited as causes of cancellation in the past. The costs associated with these potential cancellations are estimated, along with their regional distributions, and likely methods of cost recovery are suggested.

22 NUCLEAR REACTOR TECHNOLOGY

2201 Theory And Calculation

31675 (CONF-8109217—1) Long-time behavior of a nuclear reactor. Kaper, H.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83009499.

From LABCON '81 conference; Chicago, IL, USA (17 Sep 1981).

A fundamental problem of reactor physics is the determination of the long-time behavior of the neutron population in a nuclear reactor. In particular, one is interested in the question whether the total neutron density has a purely exponential behavior as $t \to \infty$. We formulate this problem as an abstract Cauchy problem, show that the solution is given by a semigroup, and investigate the asymptotic behavior of the semigroup.

31676 (IKE—6-134) Comparison of newer thermodynamical single-channel models with an experiment. Blender, H.; Elzmann, J. (Stuttgart Univ. (Germany, F.R.). Abt. Reaktorphysik). Nov 1981. 95p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750257.

To investigate the power of the programmes COCHA, FRANCESCA, MARMITA, STASWR and THS several computational proofs were performed. Several measurements of the FRIGG project were available for these computational proofs. The influences of the different models for under-cooled boiling (Levy, Maroti) and for slippage (Bankoff, Bankoff-Jones, Armand) on the characteristic of steam content could be determined by comparison of the computed and the measured values.

31677 (IKE—6-137) Thermohydraulic feedback of the so-called 'Lupen-Problem' with a one-dimensional model. Ehrhard, W.D.; Elzmann, J. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Nov 1981. 56p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750035.

In order to perform a detailled nuclear study in the vicinity of the topmost end of a control element in a BWR the socalled Lupenverfahren was developed. Because of the strong coupling between fluid density and power generation in the fuel element, an iterative correction between the nuclear and the thermohydraulic calculations is necessary. Therefore the nuclear code LUPE was coupled with the very complex subchannel analysis COBRA III C. In order to reduce the cost of the thermohydraulic calculations a very simple one-dimensional thermohydraulic model was used together with LUPE. The differences between this simple version and LUPE-COBRA III C calculations were investigated. In addition a study was performed to what extent a subdivision of the considered region into several regions, eachone treated with the one-channel model, influenced the results of the coupled calculations and to what extent calculations with this subdivision approached the LUPE-COBRA III C results.

2202 Components And Accessories

REFER ALSO TO CITATION(S) 31599, 31778, 32062

31678 **(NUREG/CR—3229) Exploratory assessment of postirradiation heat-treatment variables in notch-ductility recovery of A5333-B steel.** Hawthorne, J.R. (Materials Engineering Associates, Inc., Lanham, MD (USA)). Apr 1983. 17p. (MEA—2011). NTIS, PC A02/MF A01 - GPO $3.25. Order Number DE83901754.

Charpy-V specimens of an A533-B steel plate irradiated at 288°C to 2.4 x 10^{19} n/cm^2 > 1 MeV were used to determine the relative effectiveness of seven different heat treatments for notch-ductility recovery. The plate was selected for study because of its 0.20% copper content for high radiation-embrittlement sensitivity. Heat-treatment temperatures were 343°, 399°, 427° and 454°C; heat-treatment times were 24, 168, 336, and 425 hours. The experimental results indicate that full recovery can be obtained in some pressure-vessel steels irradiated at 288°C using a 454°C to 168h anneal. However, the effectiveness of this treatment is shown to be highly material dependent. The results also demonstrate that heat treatments yielding full upper-shelf recovery may not produce full transition-temperature recovery.

31679 **(NUREG/CR—3261) Cooperative test program on crack-arrest toughness measurements. Final report.** Crosley, P.B.; Fourney, W.L.; Hahn, G.T.; Hoagland, R.G.; Irwin, G.R.; Ripling, E.J. (Maryland Univ., College Park (USA). Coll. of Engineering). Apr 1983. 201p. NTIS, PC A10/MF A01 - GPO $7.00. Order Number DE83901713.

Portions are illegible in microfiche products.

For the past decade or so, only a relatively small number of laboratories have been involved in using linear elastic fracture mechanics to generate information on crack arrest toughness, and even fewer have been concerned with the development of test methods. In order to encourage a wider participation in crack arrest studies, and in order for organizations interested in this topic to become familiar with current test methods, a cooperative test program was undertaken under the auspices of ASTM Committee E24.01.06. The cooperative program was chosen rather than the more usual round robin, because two different concepts had been proposed for evaluating crack arrest toughness, and it was felt that ome of the differences between these approaches would have to be resolved before attempting a more formal round robin. Hence, in addition to introducing the participants to the two methods, it was hoped that the large number of tests involved in the program would assest in making a decision as to which of the two methods should be pursued in a round robin.

2203 Fuel Elements

31680 **(CEA-N—2272) TOMOGAM, a bidimensional reconstruction method of nuclide repartition in an irradiated nuclear fuel from transversal gamma scanning at various incidences.** Schwartz, A.; Pineira, T. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1980. 20p. (In French). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700371.

The principle is as follows: given a vertical axis cylindrical fuel rod, the gamma activity emitted by a nuclide in a horizontal slice of the rod is measured. A transversal image of the nuclide distribution area by area is obtained in this way, given the distribution chosen for "dividing up" the measurement. The method consists in carrying out several transversal scans of the fuel rod from different view angles (typically two perpendicular scans). Upon examination, each scan provides a transversal image composed of spectra (typically 50) relative to the collimation width. By means of a 4096 channel analyzer, isotopic images at each energy become available. These image are used by a calculation code to reconstitute the two dimensional isotopic distribution which gave rise to these images. The tomographic method for studying the two dimensional distribution of the fission products by transversal gamma scrutiny enables the inhomogeneities to be revealed, even the over accumulations of fission products in certain parts of the fuel or the fuel/cladding interface, and to follow up, in conjunction with the power histogram to which the rod is subjected in the reactor, any possible defects in the distribution of fission products.

31681 **(CEGB-RD/B—5163N81) Investigation into the heat transfer performance of helically ribbed surfaces.** Firth, R.J. (Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.). Dec 1981. 28p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700828.

The first part of an investigation into flow and heat transfer in annular channels and seven pin clusters is described. One of the main aims of the project is to improve cluster heat transfer prediction codes for helically ribbed surfaces. A study is made of the heat transfer and flow characteristics of a helically ribbed pin in an annular channel. It is shown that the swirling flow, which is induced by the helical ribs, gives rise to substantially enhanced diffusivity levels. This phenomenon had not been taken into account by previous analysis techniques. The methods for analysing heat transfer and pressure drop data from annular channels which were originally developed for non-swirling flow are generalised to accommodate swirling flow. The new methods are shown to be consistent with empirical data. Roughness parameter data is presented for helically ribbed surfaces with an axial rib pitch into height ratio of about 7.

31682 (INIS-mf—7498, pp vp) **Wall boundary conditions for the calculation of non-logarithmic turbulent flow in rod bundles.** Naot, D. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31683 (INIS-mf—7498, pp vp) **Experimental evaluation of heat transfer coefficients in direct contact using oil film.** Naot, D. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering); Magen, U.; Dary, R. (Center for Technological Education, Holon (Israel)). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31684 (INIS-mf—7498, pp vp) **Numerical false diffusion in the calculation of turbulent channel flow.** Naot, D. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31685 (INIS-mf—7498, pp vp) **Analytical solution of the characteristic equation for a one-dimensional drift-flux model for all flow patterns.** Kaizerman, S.; Wacholder, E.; Elias, E. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31686 **(KFK—3361) Experimental investigations on the fluid flow through a wall subchannel of a rod bundle (P/D = 1.036, W/D = 1.072).** Rehme, K. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik). Jul 1982. 63p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750018.

Measurements of the distributions of the mean velocity, the wall shear stresses and the turbulence were performed in a wall subchannel of a rod bundle of four parallel rods arranged symmetrically in a rectangular channel (P/D = 1.036, W/D = 1.072). The Reynolds number of this investigation was Re = 7.60 x 10^4. The experimental results show that the momentum transport is highly anisotropic especially in the gaps of the rod bundle. Influences of secondary flow cannot be detected in the distribution of the time-mean velocity, however, such influences are found in the distributions of the turbulence intensities and the kinetic energy of turbulence. Very high turbulence intensities were observed in the gap between the rods. The comparison between experimental wall shear

stress distributions and those calculated with the VELASCO-code shows discrepancies especially in the gap between the rods.

31687 **(OEFZS—4161) Scoping study on the effect of heated shrouds on fuel rod test behaviour.** Sdouz, G. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna). Apr 1982. 45p. (In German). (RS—201/82). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700374.

To investigate the experimentally obtained results at fuel rod tests with and without a heated shroud several models in the BALOON-2 code were improved. Azimuthal heat conduction, radiation between cladding and shroud, radiation between cladding and pellet and a new coolant temperature model were added to the code. With the improved version of the code a series of calculations was performed to analyse the data. In general the model overpredicts the experimental strain values and does not predict the experimental results at low heating rates.

31688 **Duct and cladding alloy.** Korenko, M.K. (to Dept. of Energy). US Patent 4,377,553. 22 Mar 1983. Filed date 28 May 1980. vp.

PAT-APPL-155231.

An austenitic alloy having good thermal stability and resistance to sodium corrosion at 700° C consists essentially of 35-45% nick 5-14% chromi 8-3.2% molybden 3-1.0% silic 2-1.0% mangane 0-0.1% zirconiu 0-3.5% titani 0-2.0% alumin 02-0.1% car 0-0.01% boro and the balance iron.

2204 Control Systems

REFER ALSO TO CITATION(S) 31677

31689 **(AECL—7514) Co and Cd absorber rod experiments in ZED-2.** Arbique, G.M. (Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.). Feb 1981. 45p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700375.

Experiments have been performed in the ZED-2 critical facility to evaluate reactivity worths of NRU cobalt and cadmium absorber rods. The object of the measurements was to provide data useful in validating NRU reactor physics codes. Using a Cd or Co absorber rod in a ZEEP rod lattice, measurements were made of absorber rod reactivity worths; relative fluxes in the vicinity of the absorber rod and throughout the lattice; and Westcott r√(T/Tsub(o)) values, to obtain some neutron spectrum information.

31690 **High temperature liquid level sensor.** Tokarz, R.D. (to Dept. of Energy). US Patent 4,377,550. 22 Mar 1983. Filed date 29 Jan 1981. vp.

PAT-APPL-229498.

A length of metal sheathed metal oxide cable is perforated to permit liquid access to the insulation about a pair of conductors spaced close to one another. Changes in resistance across the conductors will be a function of liquid level, since the wetted insulation will have greater electrical conductivity than that of the dry insulation above the liquid elevation.

31691 **Optical fuel pin scanner.** Kirchner, T.L.; Powers, H.G. (to Dept. of Energy). US Patent 4,376,582. 15 Mar 1983. Filed date 9 Dec 1980. vp.

PAT-APPL-214805.

An optical scanner for indicia arranged in a focal plane at a cylindrical outside surface by use of an optical system including a rotatable dove prism. The dove prism transmits a rotating image of an encircled cylindrical surface area to a stationary photodiode array.

2205 Environmental Aspects

REFER ALSO TO CITATION(S) 31669, 32467, 32476

31692 **(CSIR-T/SEA—8117) Wave conditions off Koeberg. Spring 1977.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700324.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Spring 1977. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31693 **(CSIR-T/SEA—8118) Wave conditions off Koeberg. Summer 1978.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700325.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Summer 1978. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31694 **(CSIR-T/SEA—8119) Wave conditions off Koeberg. Autumn 1978.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700326.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Autumn 1978. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31695 **(CSIR-T/SEA—8120) Wave conditions off Koeberg. Winter 1978.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700327.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Winter 1978. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31696 **(CSIR-T/SEA—8121) Wave conditions off Koeberg. Spring 1978.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700328.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Spring 1978. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31697 **(CSIR-T/SEA—8122) Wave conditions off Koeberg. Summer 1979.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700329.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Summer 1979. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31698 **(CSIR-T/SEA—8123) Wave conditions off Koeberg. Autumn 1979.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700330.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with data for Autumn 1979. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31699 **(CSIR-T/SEA—8124) Wave conditions off Koeberg. Winter 1979.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 25p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700331.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Winter 1979. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31700 **(CSIR-T/SEA—8125) Wave conditions off Koeberg. Spring 1979.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700332.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Spring 1979. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31701 **(CSIR-T/SEA—8126) Wave conditions off Koeberg. Summer 1980.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700333.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for summer 1980. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31702 **(CSIR-T/SEA—8127) Wave conditions off Koeberg. Autumn 1980.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700334.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for autumn 1980. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31703 **(CSIR-T/SEA—8128) Wave conditions off Koeberg. Winter 1980.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700335.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for winter 1980. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31704 **(CSIR-T/SEA—8129) Wave conditions off Koeberg. Spring 1980.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 24p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700336.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily avialable to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for Spring 1980. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31705 **(CSIR-T/SEA—8130) Wave conditions off Koeberg. Summer 1981.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700337.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for summer 1981. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31706 **(CSIR-T/SEA—8131) Wave conditions off Koeberg. Autumn 1981.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700338.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for autumn 1981. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31707 **(CSIR-T/SEA—8132) Wave conditions off Koeberg. Winter 1981.** (Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology). Nov 1981. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700339.

Digitised wave data have been collected by means of a waverider buoy off Koeberg since November 1977. To make the data readily available to interested parties such as oceanographers, engineers and marine scientists, three-monthly reports on the data are issued. This is one of these reports and deals with the data for

winter 1981. The data were collected by the Electricity Supply Commission (ESCOM) and analysed by the National Research Institute for Oceanology (NRIO) who compiled this report.

31708 **(KFK—3343) Physico-chemical ^{131}I species in the stack exhaust air of a boiling water reactor.** Deuber, H. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Lab. fuer Aerosolphysik und Filtertechnik 2). Jul 1982. 17p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750043.

In the stack exhaust air of a German boiling water reactor, the fractions of elemental, particulate and organic ^{131}I were determined over a period of three years. The average fraction of elemental ^{131}I, which is decisive for the ingestion dose, was about 20% during the first two years and about 50% during the third year.

2206 Research, Test, And Experimental Reactors

REFER ALSO TO CITATION(S) 31764, 32137

31709 **(CONF-821155—8) Irradiation behavior of miniature experimental uranium silicide fuel plates.** Hofman, G.L.; Neimark, L.A.; Mattas, R.F. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83010698.

From International meeting on research and test reactor core conversions from HEU to LEU fuels; Argonne, IL, USA (8 Nov 1982).

Uranium silicides, because of their relatively high uranium density, were selected as candidate dispersion fuels for the higher fuel densities required in the Reduced Enrichment Research and Test Reactor (RERTR) Program. Irradiation experience with this type of fuel, however, was limited to relatively modest fission densities in the bulk from, on the order of 7×10^{20} cm^{-3}, far short of the approximately 20×10^{20} cm^{-3} goal established for the RERTR program. The purpose of the irradiation experiments on silicide fuels on the ORR, therefore, was to investigate the intrinsic irradiation behavior of uranium silicide as a dispersion fuel. Of particular interest was the interaction between the silicide particles and the aluminum matrix, the swelling behavior of the silicide particles, and the maximum volume fraction of silicide particles that could be contained in the aluminum matrix.

31710 **(KFK—3372B) Investigations of uranium silicide-based dispersion fuels for the use of low enrichment uranium (LEU) in research and test reactors.** Nazare, S. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung). Jul 1982. 41p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750014.

The work presents at the outset, a review of the preparation and properties of uranium silicides (U_3Si and U_3Si_2) in so far as these are relevant for their use as dispersants in research reactor fuels. The experimental work deals with the preparation and powder metallurgical processing of Al-clad miniature fuel element plates with U_3Si- und U_3Si-Al up to U-densities of 6.0 g U/cm^3. The compatibility of these silicides with the Al-matrix under equilibrium conditions (873 K) and the influence of the reaction on the dimensional stability of the miniplates is described and discussed.

31711 **(ORNL/TM—2676/R1) Operating manual for the Bulk Shielding Reactor.** (Oak Ridge National Lab., TN (USA)). Apr 1983. Contract W-7405-ENG-26. 615p. NTIS, PC A99/MF A01. Order Number DE83011061.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The BSR is a pool-type reactor. It has the capabilities of continuous operation at a power level of 2 MW or at any desired lower power level. This manual presents descriptive and operational information. The reactor and its auxillary facilities are described from physical and operational viewpoints. Detailed operating procedures are included which are applicable from source-level startup to full-power operation. Also included are procedures relative to the safety of personnel and equipment in the areas of experiments, radiation and contamination control, emergency actions, and general safety. This manual supercedes all previous operating manuals for the BSR.

2209 Reactor Safety

REFER ALSO TO CITATION(S) 31664, 31667, 31839, 31840, 32568, 32940

31712 **(AECL—6826) Model for vented deflagration of hydrogen in a volume.** Mulpuru, S.R.; Wilkin, G.B. (Atomic Energy of Canada Ltd., Pinawa, Manitoba. Whiteshell Nuclear Research Establishment). Feb 1982. 62p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83700321.

A simple model was constructed to predict the property transients resulting from the deflagration of a combustible mixture in a sphere or cylinder with venting of the gas mixture to the environment. A computer program VENT, was written to solve the model equation. The model will be particularly useful for studying hydrogen burning effects in loss-of-coolant plus loss of emergency coolant accidents in CANDU reactors.

31713 **(B—286-0483) Annotated bibliography of GEND-sponsored TMI-2 reports.** (EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 12p. NTIS, PC A02/MF A01. Order Number DE83011438.

In the continuing effort to distribute information about the TMI-2 cleanup and recovery effort, the GEND group has sponsored publication of 70 reports to date on various aspects of the Technical Information and Examination Program. Each report is indicated below by number, title, and date of publication, and followed by a brief description. For the formal reports, the National Technical Information Service price codes are indicated within parentheses following the date of publication (where available). The first code is for printed copy; the second is for microfiche.

31714 **(BNL-NUREG—32444) Momentum integral network method for thermal-hydraulic transient analysis.** Van Tuyle, G.J. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 6p. (CONF-830609—1). NTIS, PC A02/MF A01. Order Number DE83006493.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

A new momentum integral network method has been developed, and tested in the MINET computer code. The method was developed in order to facilitate the transient analysis of complex fluid flow and heat transfer networks, such as those found in the balance of plant of power generating facilities. The method employed in the MINET code is a major extension of a momentum integral method reported by Meyer. Meyer integrated the momentum equation over several linked nodes, called a segment, and used a segment average pressure, evaluated from the pressures at both ends. Nodal mass and energy conservation determined nodal flows and enthalpies, accounting for fluid compression and thermal expansion.

31715 **(BNL-NUREG—32496) Measurements and analysis of steam generators rate from quenching of superheated debris beds.** Ginsberg, T.; Klein, J.; Klages, J.; Chen, J. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 7p. (CONF-830609—3). NTIS, PC A02/MF A01. Order Number DE83006681.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

Light water reactor degraded core accident sequences have been postulated which lead to deposition of superheated debris beds in the reactor cavity. The debris beds are assumed to be cooled by an overlying pool of cooling water. The quenching of the debris is predicted to pressurize the containment building as a result of the steam generated during the quench process. Mechanistic models of debris bed quenching are required to predict the containment pressurization response to the steam and to the gases released from the concrete. The objective of this paper is to present recent experimental data for the rate of steam generation resulting from cooling of superheated packed beds of spheres by a saturated overlying pool of water. The effects of bed temperature and of sphere diameter are discussed.

31716 **(BNL-NUREG—32501) BWR thermohydraulics simulation on the AD-10 peripheral processor.** Wulff, W.; Cheng, H.S.; Lekach, S.V.; Mallen, A.N. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 6p. (CONF-830609—2). NTIS, PC A02/MF A01. Order Number DE83006682.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

This presentation demonstrates the feasibility of simulating plant transients and severe abnormal transients in nuclear power plants at much faster than real-time computing speeds in a low-cost, dedicated, interactive minicomputer. This is achieved by implementing advanced modeling techniques in modern, special-purpose peripheral processors for high-speed system simulation. The results of this demonstration will impact safety analyses and parametric studies, studies on operator responses and control system failures and it will make possible the continuous on-line monitoring of plant performance and the detection and diagnosis of system or component failures.

31717 **(BNL-NUREG—32502) Human error identification and analysis implicitly determined from LERs.** Luckas, W.J. Jr.; Speaker, D.M. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 7p. (CONF-830609—5). NTIS, PC A02/MF A01. Order Number DE83007392.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

As part of an ongoing effort to quantify human error using modified task analysis on Licensee Event Report (LER) system data, the initial results have been presented and documented in NUREG/CR-1880 and -2416. These results indicate the relatively important need for indepth anlaysis of LERs to obtain a more realistic assessment of human error caused events than those explicitly identified in the LERs themselves.

31718 **(BNL-NUREG—32506) Shape reactivity effects it the rod ejection accident.** Neogy, P.; Carew, J.F. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 8p. (CONF-830609—4). NTIS, PC A02/MF A01. Order Number DE83007390.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

Detailed three-dimensional MEKIN-B calculations of the PWR control rod ejection accident (REA) are being performed as part of the BNL/NRC evaluation of methods currently used to analyze PWR REA events. A principal objective of these calculations has been to evaluate in three dimensions the effect of flux redistribution on the core transient reactivity and hence on transient core power level.

31719 **(BNL-NUREG—32574) Analysis of FLECHT-SEASET Steam Generator tests with TRAC-PF1 and RELAP5/MOD1.** Slovik, G.; Saha, P. (Brookhaven National Lab., Upton, NY (USA)). Jan 1983. Contract AC02-76CH00016. 6p. (CONF-830609—7). NTIS, PC A02/MF A01. Order Number DE83008588.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

Several separate-effects tests were conducted in the FLECHT-SEASET Steam Generator as part of a NRC/EPRI/Westinghouse reflood program. Two of these tests have been analyzed at BNL using the advanced computer codes TRAC-PF1 (Version 7.0) and RELAP5/MOD1 (Cycle 14). This paper presents the results of these analyses and indicates the areas where further code improvements are necessary.

31720 **(BNL-NUREG—32585) Assessment of TRAC codes with Dartmouth College counter-current flow tests.** Rohatgi, U.S. (Brookhaven National Lab., Upton, NY (USA)). Jan 1983. 6p. (CONF-830609—8). NTIS, PC A02/MF A01. Order Number DE83008586.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

Brookhaven National Laboratory is involved in assessing the thermohydraulic models in various advanced codes such as TRAC-PF1 and TRAC-BD1. These codes have two fluid formulations which require constitutive relationships describing interfacial mass, energy and momentum transfer. These models are either developed from some separate effect tests or in some cases are ad hoc. There is a need to assess the validity and limitations of these models as they are implemented in the code. In this paper, the effort is concentrated on testing the interfacial momentum transfer model in counter-current flow situations which may arise in the core, downcomer, upper tie plate, steam generator, etc., under many accident and transient situations.

31721 **(CEA-CONF—6150) Application of the pattern recognition technique to fast reactor acoustic monitoring.** Brunet, M.; Val, M. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Oct 1981. 18p. (In French). (CONF-8110185—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700376.

From AFCET automation congress; Nantes, France (27 Oct 1981).

The early detection of operating anomalies is an aim involving the safety of fast reactors. The most likely accident is the complete or partial blocking up of an assembly, one of the signs of which is the boiling of the sodium contained in it. This boiling is accompanied by the production of acoustic waves, the detection of which by appropriate sensors appears to be an efficient way of monitoring the core. For a number of years the CEA has been conducting an experimental programme for studying the detection of boiling by acoustic means. The text presents the various different experiments undertaken and then draws a parallel between the results obtained by conventional processing procedures and those obtained by applying the shape recognition method to the same basic data.

31722 **(CONF-810803—35) TREAT experimental data base regarding fuel dispersals in LMFBR loss-of-flow accidents.** Simms, R.; Fink, C.L.; Stanford, G.S.; Regis, J.P. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83010596.

From Topical meeting on reactor safety aspects of fuel behavior; Sun Valley, ID, USA (2 Aug 1981).

The reactivity feedback from fuel relocation is a central issue in the analysis of loss-of-flow (LOF) accidents in LMFBRs. Fuel relocation has been studied in a number of LOF simulations in the TREAT reactor. In this paper the results of these tests are analyzed, using, as the principal figure of merit, the changes in equivalent fuel worth associated with the fuel motion. The equivalent fuel worth was calculated from the measured axial fuel distributions by weighting the data with a typical LMFBR fuel-worth function. At nominal power, the initial fuel relocation resulted in increases in equivalent fuel worth. Above nominal power the fuel motion was dispersive, but the dispersive driving forces could not unequivocally be identified from the experimental data.

31723 **(CONF-820601—30) Some aspects of fluid-structure coupling.** Kulak, R.F. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 36p. NTIS, PC A03/MF A01. Order Number DE83010575.

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

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This paper primarily discusses the formulation used in an algorithm that couples three-dimensional hydrodynamic and structural domains. The fluid domain is governed by the Navier-Stokes equations, and the structural domain is governed by the equations of nonlinear structural dynamics. Here, both the fluid and structure are discretized using finite elements. The fluid is discretized with eight-noded quasi-Eulerian hexahedrons and the structural components are represented by Lagrangian triangular plate elements. The semi-discretized equations of motion are solved using an explicit temporal integrator. The coupling is accomplished by satisfying interface mechanics. The structure imposes kinematic constraints to the moving fluid boundary, and the fluid in turn provides an external loading on the structure. At each interface node, normals are computed from the nodal basis functions of only the hydrodynamic nodes. By defining the interface normal in this manner, it becomes independent of the type of structural boundary (i.e. shell, plate, continuum etc.) and thus makes this aspect of the coupling independent of the structure type.

31724 **(CONF-820601—32) Multi-dimensional arbitrary Lagrangian-Eulerian method for dynamic fluid-structure interaction.** Wang, C.Y.; Zeuch, W.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 36p. NTIS, PC A03/MF A01. Order Number DE83010577.

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

This paper describes an arbitrary Lagrangian-Eulerian method for analyzing fluid-structure interactions in fast-reactor containment with complex internal structures. The fluid transient can be calculated either implicitly or explicitly, using a finite-difference mesh with vertices that may be moved with the fluid (Lagrangian), held fixed (Eulerian), or moved in any other prescribed manner (hybrid Lagrangian Eulerian). The structural response is computed explicitly by two nonlinear, elastic-plastic finite-element modules formulated in corotational coordinates. Interaction between fluid and structure is accounted for by enforcing the interface boundary conditions. The method has convincing advantages in treating complicated phenomena such as flow through perforated structures, large material distortions, flow around corners and irregularities, and highly contorted fluid boundaries. Several sample problems are given to illustrate the effectiveness of this arbitrary Lagrangian-Eulerian method.

31725 **(CONF-821021—4) Multi-state component models for reliability and risk analysis.** Vaurio, J.K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83010715.

From DOE statistical symposium; Idaho Falls, ID, USA (13 Oct 1982).

Multi-state single-plant risk models are developed and the impacts of various failure and repair characteristics associated with safe shutdown and multiple accident conditions are analyzed. Comparisons of models are presented and recommendations are made for selecting a model. Fundamental recursive equations are then derived for the probabilistic characteristics of components in general. These equations are new results for multi-state components, allow replacement components to be new or old, and allow general failure and repair time distributions to be used. The equations are solved for the time dependent state probabilities and conditional and unconditional failure and repair rates.

31726 **(CONF-830609—9) Critical heat flux predictions based on the BODYFIT-2PE computer code and Columbia University CHF correlation.** Chen, B.C.J.; Chien, T.H.; Sha, W.T.; Kim, J.H. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83009493.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).
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The BODYFIT-2PE (Boundary-Fitted Coordinate, 2-Phase Flow with Partially Elliptic) computer code has been developed and was employed to simulate the critical heat flux experiment in a General Electric 3 x 3 rod bundle by using a CHF correlation recently developed at Columbia University under EPRI sponsorship. CHF predictions are important in analyzing rod bundle performance in nuclear reactor operation. The results of the BODYFIT calculations compared favorably with the experimental measurements.

31727 **(CONF-830609—10) Blow-down tests in a sodium-heated steam generator tube.** France, D.M.; Carlson, R.D.; Chiang, T. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83009608.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

The design of steam generators for liquid metal fast breeder reactor (LMFBR) electric power plants is based on both normal load operation and plant transient conditions. Perhaps the most severe transient to which an LMFBR steam generator may be subjected is known as the water-side isolation and dump transient, often called the blow-down transient. LMFBR steam generators must be designed to accommodate a small but finite number of the blow-down transients. The purpose of this investigation was to perform a blow-down experiment in a well instrumented, full scale, single tube model of an LMFBR steam generator. The data may be used directly in steam generator design and as a validation point for steam generator mathematical models in plant transient computer codes.

31728 **(CONF-830609—11) Post-initiating phase neutronics analysis of an unprotected LOF event in CRBRP.** Turski, R.B.; Rhow, S.K. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83010763.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).
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The reactor system is expected to achieve permanent subcriticality in a loss-of-flow (LOF) event by virtue of fuel removal from the core even under the hypothetical assumption that both shutdown systems fail to function. Based on the analysis performed by S.K. Rhow, et al., adequate fuel removal would occur in the CRBRP heterogeneous core during a meltout period after the initiating phase of the unprotected LOF event. This paper discusses reactivity levels relative to fuel removal in the accident progression beyond the initiating phase for the CRBRP core at the beginning of cycle 1 (BOC-1).

31729 **(EGG-EE—6219) Interim safety-related criteria for signal isolation devices used in commercial nuclear power plants.** Morrison, J.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 30p. NTIS, PC A03/MF A01. Order Number DE83011453.

This report is intended to supply a minimum set of criteria which can be used to evaluate the adequacy of safety system analog and digital isolation devices. This report is supplied as part of the research to assess microprocessor-based system design and associated isolation devices being conducted for the US Nuclear Regulatory Commission, Office of Nuclear Reactor Research, Division of Facility Operations, Instrumentation and Control Branch.

31730 **(EGG-M—13782) Forced-convective nonequilibrium post-CHF heat-transfer experiments in a vertical tube.** Gottula, R.C.; Nelson, R.A.; Chen, J.C.; Neti, S.; Sundaram, R.K. (EG and G Idaho, Inc., Idaho Falls (USA); Lehigh Univ., Bethlehem, PA (USA). Inst. of Thermo-Fluid Engineering and Science; Yankee Atomic Electric Co., Framingham, MA (USA)). 1983. Contract AC07-76ID01570. 9p. (CONF-830301—16). NTIS, PC A02/MF A01. Order Number DE83009707.

From ASME-JSME thermal engineering joint conference; Honolulu, HI, USA (20 Mar 1983).
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Forced-convective postcritical heat flux (CHF) heat transfer data have been obtained at low flow rates and low pressures (0.2 to 0.7 MPa) for water flowing in a vertical tube. Significant magnitudes of superheat (up to 510 K) were found. The steady state data are in agreement with other reported low-flow and low-pressure nonequilibrium data. Nonequilibrium vapor temperatures were measured at 3 different axial positions with differentially aspirated microthermocouple probes to determine the rate of change of vapor superheat and actual flowing quality with respect to length in the test section. These original measurements of actual quality with respect to length provide a valuable data base from which to verify or develop mechanistic flow and heat-transfer models, such as vapor generation rate models.

31731 **(EGG-PHYS—6201) Radiation-shielding calculations for the UPTF gamma-ray densitometer.** Grimesey, R.A.; Tomberlin, T.A. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 17p. NTIS, PC A02/MF A01. Order Number DE83012127.

The UPTF densitometer is part of the international 2D/3D Program, a joint reactor safety research effort by the United States, West Germany, and Japan. UPTF is a full scale PWR upper plenum facility to be used for refill and reflood tests. It is a nonnuclear facility which will use programmed steam and water injection to study two and three dimensional flow phenomena. UPFT includes full scale PWR hot and cold legs and the subject densitometers are to be placed on the four horizontal hot legs and one horizontal broken cold leg. The mechanical design of the UPTF densitometer was iterated against the radiation shielding design in order to ensure that the dose rate at the surface of the densitometer

would not exceed 2.5 mR/h. The equations and parameters used in the radiation shielding calculations are discussed. The actual calculations and parameters used for each dose point are outlined.

31732 **(EPRI-NP—2951) Modeling of natural-circulation phenomena in nuclear-reactor cooling loops. Final report.** Zvirin, Y.; Rabinoviz, Y. (Technion-Israel Inst. of Tech., Haifa. Dept. of Mechanical Engineering). Mar 1983. 139p. NTIS, PC A07/MF A01. Order Number DE83901923.

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Theoretical models have been developed to study the steady-state, stability, and transient behavior of single-phase natural-circulation flow systems with parallel branches, relevant to emergency core cooling of pressurized-water reactors. The models are based on one-dimensional conservation equations of continuity, momentum and energy. Analytical and numerical methods have been employed and general computer programs derived to calculate the temperature distributions, flow rates and heat balances in systems having UT or OT steam generators. The results were compared with available data for steady-state flows and good agreement has been found. A parametric study has been performed to evaluate the effects of the various system components.

31733 **(GEND-INF—023-Vol.4) Analysis of the Three Mile Island Unit 2 hydrogen burn. Volume 4.** Henrie, J.O.; Postma, A.K. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). Mar 1983. Contract AC07-76ID01570. 55p. NTIS, PC A04/MF A01. Order Number DE83012186.

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As a basis for the analysis of the hydrogen burn which occurred in the Three Mile Island Containment on March 28, 1979, a study of recorded temperatures and pressures was made. Long-term temperature information was obtained from the multipoint temperature recorder which shows 12 containment atmosphere temperatures plotted every 6 min. The containment atmosphere pressure recorder provided excellent long- and short-term pressure information. Short-term information was obtained from the multiplex record of 24 channels of data, recorded every 3 sec, and the alarm printer record which shows status change events and prints out temperatures, pressures, and the time of the events. The timing of these four data recording systems was correlated and pertinent data were tabulated, analyzed, and plotted to show average containment temperature and pressure versus time. Photographs and videotapes of the containment entries provided qualitative burn information.

31734 **(GEND-INF—030) Analysis of air-temperature measurements from the Three Mile Island Unit 2 reactor building.** Fryer, M.O. (EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 41p. NTIS, PC A03/MF A01. Order Number DE83011491.

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The performance of the ambient air resistance temperature detectors (RTDs) just after the hydrogen burn in the TMI-2 Reactor Building is examined. The performance of the sensors is compared with physical models of the sensor/ambient air system. With one exception, the RTD data appear to be valid for the period examined. Based on the data, the hydrogen burn ended considerably before the first data points were recorded.

31735 **(GEND-INF—032-Vol.1) Radionuclide mass balance for the TMI-2 accident: data-base system and preliminary mass balance. Volume 1.** Goldman, M.I.; Davis, R.J.; Strahl, J.F.; Arcieri, W.C.; Tonkay, D.W. (NUS Corp., Gaithersburg, MD (USA)). Apr 1983. Contract AC07-76ID01570. 95p. NTIS, PC A05/MF A01. Order Number DE83012090.

After the accident at Three Mile Island, Unit 2 (TMI-2), on March 28, 1979, GEND stated its intention to support an effort to determine, as accurately as possible, the current mass balances of significant radiological toxic species. GEND gave two primary reasons for support this effort: (1) such exercises guarantee completeness of the studies, and (2) mass balance determinations ensure that all important sinks and attentuation mechanisms have been identified. The primary objective of the studies conducted by NUS Corporation was to support the goals of the GEND planners and to continue the mass balance effort by generating a preliminary accounting of key radioactive species following the TMI-2 accident. As a result of these studies, secondary objectives, namely a computerized data base and recommendations, have been achieved to support future work in this area.

31736 **(GEND-INF—032-Vol.2) Radionuclide mass balance for the TMI-2 accident: data-base system and preliminary mass balance. Volume 2.** Goldman, M.I.; Davis, R.J.; Strahl, J.F.; Arcieri, W.C.; Tonkay, D.W. (NUS Corp., Gaithersburg, MD (USA)). Apr 1983. Contract AC07-76ID01570. 169p. NTIS, PC A08/MF A01. Order Number DE83012091.

Tables are presented which represent the radionuclide levels following the Three Mile Island-2 reactor accident.

31737 **(GEND-INF—038) Assessment of the TMI-2 axial power-shaping-rod dynamic test results.** Garner, R.W.; Owen, D.E.; Martin, M.R. (EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 46p. NTIS, PC E04/MF A01. Order Number DE83011489.

Includes 5 sheets of 24x reduction microfiche.

The Three Mile Island-Unit 2 (TMI-2) nuclear power reactor contains 61 control rod assemblies and 8 axial power shaping rod assemblies (APSRs). All control rod and APSR drive leadscrews must be uncoupled and removed prior to vessel head removal. Leadscrew removal is facilitated by having the rod assemblies inserted to a down hard-stop position. Following the TMI-2 accident, the eight axial power shaping rods were in a partially withdrawn position (~ 25% of their full travel). Therefore, a test was performed to attempt to insert the APSRs to the fully inserted, or at least a hard-stop position. In addition, accelerometers were mounted on the drive mechanisms of all the APSRs in an attempt to obtain acoustical signals that would provide some information about the physical condition of the APSRs and of the damaged TMI-2 reactor core. This report describes the TMI-2 APSR Insertion Test performance and results, and presents an evaluation of correlations between APSR insertion information and other available information on the condition of the TMI-2 reactor.

31738 **(GRS—46) Effects of mechanical loads due to power excursions on the reactor tank.** Meier, S. (Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)). Jun 1982. 51p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750258.

Coupled fluid dynamics/structural mechanics codes are developed since 10 years to solve problems in the field of reactor safety. Experimental programmes devised to validate these codes should include scaled models that closely resemble real reactor geometries. During tests with these models, fluid movements as well as the structural strains should be comparable to those arising in the reactor tank under accident conditions. The second shot in the 1/6 scaled model of the SNR-300 fits these conditions. The SEURB-NUK post shot calculation demonstrates the capability of the code with adequate results for all salient physical values. But the experiment and consequently the calculation is for validation purposes only suited in a limited way because of the uncertainty of the charge behaviour during the shot.

31739 **(GRS-F—120) Progress report - list of reports from BMFT, CEA, EPRI, JSTA and USNRC reactor safety research.** (Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)). Oct 1982. 39p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750390.

This list reviews reports from the Federal Republic of Germany, from France, from Japan and from the United States of America concerning special problems in the field of reactor safety research. The list pursues the following order: Country of origin, problem area concerned, according to the Reactor Safety Research Programm of the BMFT, reporting organization. The list of reports appears quarterly.

31740 **(INFO—0060) Falling film flow, heat transfer and breakdown on horizontal tubes.** Rogers, J.T. (Atomic Energy Control Board, Ottawa, Ontario (Canada)). Nov 1980. 122p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83700340.

Knowledge of falling film flow and heat transfer characteristics on horizontal tubes is required in the assessment of certain CANDU reactor accident sequences for those CANDU reactors which use moderator dump as one of the shut-down mechanisms. In these reactors, subsequent cooling of the calandria tubes is provided by falling films produced by sprays. This report describes studies of falling film flow and heat transfer characteristics on horizontal tubes. Analyses using integral methods are given for laminar and turbulent flow, ignoring and accounting for momentum effects in the film. Preliminary experiments on film flow stability on horizontal tubes are described and various mechanisms of film breakdown are examined. The work described in this report shows that in LOCA with indefinitely delayed ECI in the NPD or Douglas Point (at 70 percent power) reactors, the falling films on the calandria tubes will not be disrupted by any of the mechanisms considered, provided that the pressure tubes do not sag onto the calandria tubes. However, should the pressure tubes sag onto the calandria tubes, film disruption will probably occur.

31741 **(INFO—0061) Loss-of-coolant accidents with impaired emergency coolant injection.** Rogers, J.T. (Atomic Energy Control Board, Ottawa, Ontario (Canada)). Feb 1981. 69p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83700341.

This report describes work on loss-of-coolant accidents in CANDU reactors in which emergency coolant injection is indefinitely delayed. Two situations are considered, one in which additional heat sinks (moderator, moderator cooling system, etc.) are available and effective and the other in which they are not. For the situation in which additional heat sinks are available, the computer program IMPECC has been used for the analysis. Certain corrections and modifications to IMPECC are described and recommendations on the maximum time steps to use are given. For CANDU reactors in which calandria tubes remain submerged, should local CHF occur when a pressure tube sags onto a calandria tube, which is highly improbable, the dry patch caused would not spread beyond 10° and rewetting would occur rapidly. Calandria tube and pressure tube integrity will almost certainly be maintained. This conclusion is not affected even if the contact strip between pressure and calandria tubes is very wide, which is unlikely. For the situation in which additional heat sinks are not available, a simplified event tree has been developed to examine possible accident sequences. Two accident sequences have been selected for study: loss of moderator cooling system and loss of moderator heat sink. A detailed description of the analytical steps for the loss of moderator cooling system accident sequence is given.

31742 (INIS-mf—7475(Vol.A), pp 1-416) **Safety analysis of nuclear power plants.** Selvatici, E. (NUCLEN, Rio de Janeiro (Brazil)). 1981. (In Portuguese). NTIS (US Sales Only), PC A19/MF A01. (CONF-8104136—Vol.A.).

From 2. Brazilian energy congress; Rio de Janeiro, Brazil (6 Apr 1981).

An overview of the methodology used for the nuclear power plants Angra 2 and 3 safety analysis, specifically in the areas of Transient and LOCA analysis are presented. The aspects concerning Brazilian participation in the analysis through work performed by NUCLEN engineers in on-the-job training at the Kraftwerk Union, the know how supplier who performed the analysis and development of Nuclen's capabilities in these areas are emphasized.

31743 (INIS-mf—7475-Vol.A, pp vp) **Accident analysis in nuclear power plants.** da Silva, D.E. (Comissao Nacional de Energia Nuclear de Brasil, Rio de Janeiro:. 1981. (In Portuguese). NTIS (US Sales Only), PC A19/MF A01. (CONF-8104136—Vol.A).

From 2. Brazilian energy congress; Rio de Janeiro, Brazil (6 Apr 1981).

The way the philosophy of Safety in Depth can be verified through the analysis of simulated accidents is shown. This can be achieved by verifying that the integrity of the protection barriers against the release of radioactivity to the environment is preserved even during accident conditions. The simulation of LOCA is focalized as an example, including a study about the associated environmental radiological consequences.

31744 **(INIS-mf—7493) Managing risks: Seveso and Harrisburg.** Conrads-Herzog, A.; Krebsbach-Gnath, C. (Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)). Nov 1980. 75p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83780434.

The publications dealing with the technical, organisation-relevant, and social preconditions for risk strategies rely on second-hand information, i.e. the conclusions which are drawn from the production accident in Seveso and the TMI-accident. A comparison results in common facts as well as in fundamental differences. In contrast to the authorities in Italy the authorities in the United States intervened more rapidly; the management of necessary measures was taken over by the authorities and very good information was given.

31745 (INIS-mf—7498, pp vp) **Random fluctuations in heat production during a reactor transient.** Ben-Haim, Y. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31746 (INIS-mf—7498, pp vp) **Malfunction detection in a PWR nuclear plant.** Benoni, B.; Palmor, Z. (Technion-Israel Inst. of Techn. Haifa. Faculty of Mechanical Engineering); Ben-Haim, Y. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31747 (INIS-mf—7498, pp vp) **Quantitative evaluation of common cause failures in fault tree analysis.** Knoll, A. (Israel Atomic Energy Commission, Tel Aviv). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31748 (INIS-mf—7498, pp vp) **Investigation of passive iodine removal in a condensing environment.** Ben-Haim, Y.; Elias, E. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering); Keter, A. (Israel Atomic Energy Commission, Tel Aviv). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

31749 (INIS-mf—7499, pp vp) **Supplies of drugs for prevention and therapy of internal contamination in case of radiation accidents.** Vondracek, V.; Knajfl, J.; Neruda, O. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

31750 (INIS-mf—7499, pp vp) **Problems of preventive and routine inspections in nuclear research centre.** Chysky, J.; Garba, A.; Knot, M. (Ustav Hygieny Prace v Uranovem Prumyslu, Pribram (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

31751 (INIS-mf—7499, pp vp) **Radiation protection in refuelling of unit 1 in V-1 nuclear power plant.** Petrasova, M.; Kollar, J.; Viktory, D. (Krajska Hygienicka Stanica, Bratislava (Czechoslovakia)). 1980. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

31752 (INIS-mf—7499, pp vp) **Dose commitments of V-1 staff due to radionuclide intake during refuelling.** Herchl, M.; Ondris, D.; Homola, M. (Atomova Elektraren Bohunice, Jaslovske Bohunice (Czechoslovakia)). 1980. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

31753 (INIS-mf—7520) **Investigations of the reliability of controlled safety valves in nuclear power plants.** Arens-Fischer, F.; Bung, W.; Rueter, W. Drucks, G.; Mai, E.; Oberender, W.; Paul, H.; Hoemke, P. (Bundesministerium des Innern, Bonn (Germany, F.R.)). Sep 1981. 98p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83780446.

This report describes statistical investigations of 1378 initial and repeated functional tests carried out on controlled safety valves (SV) in conventional power plants. The results of the statistics show that the outside medium controlled SV are clearly more reliable than the intrinsic medium controlled SV. The positive development of the test results gained for intrinsic medium controlled SV from 1974 to 1980 is explained by the successful introduction of modern techniques applied in functional tests and reliability analyses. From the technical results further requirements are derived for design and construction, for type approval and functional tests of controlled SV and for the respective code..

31754 (INIS-mf—7539) **Investigations of dynamic interactions coupled by soil between neighbouring nuclear power plants of high mass in case of seismic excitation.** Matthees, W.; Magiera, G. (Bundesanstalt fuer Materialpruefung, Berlin (Germany, F.R.)). Aug 1980. 120p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83780447.

A sensitivity study for the interaction effects for adjacent structures of nuclear power plants i.e. for main buildings and auxiliary buildings has been performed due to horizontal seismic excitation. An interaction measuring rule for response spectra has been defined as the ratio of amplitude of response calculated inclusive the auxiliary building to the amplitude calculated without the auxiliary building in respect to the proper eigen-frequencies. The calculations of the three-dimensional effects are approximated with the program FLUSH. The accuracy of the achievable response herewith calculated is proven in comparison with other suitable methods. The interaction measuring rule is determined by a parameter investigation including the mathematical model consisting of the soil, the main building, and the auxiliary building. The following assumptions are asserted: 1. the soil characteristics are temporarily constant. Ignorance of the accuracy of the realistic i.e. stress depending soil values is encountered by variation of the decisive characteristics within their applicable band-width. 2. The fineness of the mathematical-mechanical modelling for the structural systems i.e. the number of the degrees of freedom is limited to a minimum. Attention is hereby paid that the eigen-frequencies of the main building as well as the eigen-frequencies of the layered soil system in the range of 0 to 10 Hz are computed with sufficient accuracy.

31755 (INIS-mf—7557, pp vp) **Nonlinear dynamics of piping subjected to hydrodynamic loads during blowdown experiments.** Habip, L.M.; Hess, J.; Widuch, L. (Kraftwerk Union A.G., Offenbach am Main (Germany, F.R.)). 1982. NTIS (US Sales Only), PC A02/MF A01. (CONF-820990—Absts.).

From 152. EUROMECH colloquium - experimental ayalysis of nonlinear problems in solid mechanics; Wuppertal, F.R. Germany (21 Sep 1982).

31756 (INS-R—270) **Probabilistics since WASH-1400.** Whitehead, N.E. (Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences). Jan 1980. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700342.

Literature since the issuing of WASH-1400 reactor safety study shows that although the methodology has been attacked, it stands criticism well. Contrary to the aim of the study, which was to give a realistic, rather than a conservative risk estimate, there are many conservatisms in it. The strongly attacked treatment of common mode failure involving the square bounding model is shown here to be very likely to give correct results - and the applications of it in WASH-1400 do not often give results different from using the mean instead of the median. The Three-Mile Island accident is not such as to change the conclusions of WASH-1400 regarding core melt probabilities.

31757 (KFK—3284) **Study of some numerical problems for SIMMER-II fluid dynamics related to the postdisassembly expansion phase for an LMFBR unprotected loss-of-flow accident.** Schmuck, P. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Schneller Brueter). Jul 1982. 47p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750037.

Using a test problem reflecting important characteristics of the postdisassembly expansion phase some numerical problems of SIMMER-II fluid dynamics are studied. The one-dimensional test problem considers the expulsion of a liquid slug by an expanding gas. SIMMER-II solutions for different mesh sizes are compared to the exact solution. The following conclusions can be drawn for SIMMER-II solutions: (1) The smearing of the gas/liquid interface is caused mainly by the upwind (donor cell) differencing used in SIMMER-II. The von Neumann formula represents this smearing very well, therefore only a weak dependence on the mesh size is observed. (2) The gas velocities do not agree very well with the exact solution. They depend strongly on the mesh size. A smaller mesh size infers initially a worse solution. (3) The gas pressures are too low, mainly in the smeared interface region. At the front of this region they decrease sharply, causing too high velocities. (4) The kinetic energy of the liquid slug agrees well with the exact value; only in the initial phase of the expansion a larger discrepancy related to a special SIMMER-II algorithm is observed.

31758 (KFK—3330) **Brief review of transition phase technology.** Maschek, W. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Schneller Brueter). Jul 1982. 50p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750039.

A brief review of important phenomena pertaining to the transition phase is given. Special emphasis is laid on the recriticality issue as this process has the potential for energetic disassemblies of the already disrupted core configuration. Questions related to recriticalities such as removal of fuel from the core region, freezing and blockage formation, the behaviour of molten/boiling fuel-steel pools (flow regimes, heat transfer etc.) are discussed.

31759 (KFK—3363) **CALIPSO - a computer code for the calculation of fluid dynamics, thermohydraulics and changes of geometry in failing fuel elements of a fast breeder reactor.** Kedziur, F. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung; Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Schneller Brueter). Jul 1982. 116p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750013.

The computer code CALIPSO was developed for the calculation of a hypothetical accident in an LMFBR (Liquid Metal Fast Breeder Reactor), where the failure of fuel pins is assumed. It calculates two-dimensionally the thermodynamics, fluid dynamics and changes in geometry of a single fuel pin and its coolant channel in a time period between failure of the pin and a state, at which the ge-

ometry is nearly destroyed. The determination of temperature profiles in the fuel pin cladding and the channel wall make it possible to take melting and freezing processes into account. Further features of CALIPSO are the variable channel cross section in order to model disturbances of the channel geometry as well as the calculation of two velocity fields including the consideration of virtual mass effects. The documented version of CALIPSO is especially suited for the calculation of the SIMBATH experiments carried out at the Kernforschungszentrum Karlsruhe, which simulate the above-mentioned accident. The report contains the complete documentation of the CALIPSO code: the modeling of the geometry, the equations used, the structure of the code and the solution procedure as well as the instructions for use with an application example.

31760 **(KFK—3390) Documentation of data implemented in the dosimetry and health effects submodels of the computer code UFOMOD/B3.** Ehrhardt, J. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Nukleare Sicherheit). Oct 1982. 98p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750242.

In the intervening period since the first conception of the accident consequence model UFOMOD of the German Risk Study, new scientific information has accumulated. Important are the newest recommendations of the ICRP 30 concerning the calculation of the dose after incorporation of radionuclides, and new data for external radiation published by the ORNL. Furtheron the resuspension model was to adapt to the climate of central Europe. For these reasons, new data sets have been prepared for the exposure pathways and organs considered within the computer code. The documentation contains a short description of the calculational procedures, all used and implemented dose conversion factors and the 'effective harm factors' applied in the health effects calculations.

31761 **(KURRI-TR—204) Internal radiation safety at nuclear facilities.** (Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.). 1978. 46p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82903629.

Information is given on radiation safety regulations within nuclear research facilities, testing for radiation content in air, surfaces, water, dust, and general radiation monitoring. A description is given of radiation monitoring equipment, its efficiency, operation, and maintenance.

31762 **(NUREG—0869) USI A-43 resolution positions.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Apr 1983. 78p. NTIS, PC A05/MF A01 - GPO. Order Number DE83901718.

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NUREG-0869 is comprised of the following documents: Proposed Regulatory Guide 1.82, Revision 1, Sump for Emergency Core Cooling and Containment Spray Systems; The Value-Impact Statement for USI A-43, Containment Emergency Sump Performance; and Background and Summary of Minutes of Meetings of the Committee to Review Generic Requirements Regarding Unresolved Safety Issue A-43 Resolution. The report has been assembled to facilitate obtaining for comment feedback on the position developed for resolution of USI A-43. There are no licensing requirements contained in NUREG-0869, and it should be clearly noted that this for comment report will not be used as interim requirements.

31763 **(NUREG—0897) Containment-emergency-sump performance. Technical findings related to Unresolved Safety Issue A-43.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Apr 1983. 127p. NTIS, PC A07/MF A01 - GPO. Order Number DE83901719.

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This report summarizes key technical findings related to the Unresolved Safety Issue A-43, Containment Emergency Sump Performance, and provides recommendations for resolution of attendant safety issues. The key safety questions relate to: (a) effects of insulation debris on sump performance; (b) sump hydraulic performance as determined by design features, submergence, and plant induced effects, and (c) recirculation pump performance wherein air and/or particulate ingestion can occur. The technical findings presented in this report provide information relevant to the design and performance evaluation of the containment emergency sump.

31764 **(NUREG/CR—0169-Vol.1) LOFT experimental measurements uncertainty analyses. Volume I. Methodology and summary.** Lassahn, G.D. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 36p. (EGG—2037-Vol.1). NTIS, PC A03/MF A01 - GPO. Order Number DE83010977.

This report describes the methodology used for estimating experimental measurement uncertainties in the Loss-of-Fluid Test (LOFT) Program. The LOFT measurement uncertainties are concisely defined in terms of an interval which includes the central 95% of the measurement results. The estimated uncertainties for each LOFT measurement system are summarized.

31765 **(NUREG/CR—2001) BWR Refill-Reflood Program: Task 4.3 - Single Heated Bundle. Final report.** Sutherland, W.A.; Barton, J.E.; Findlay, J.A. (General Electric Co., San Jose, CA (USA). Nuclear Fuel and Special Projects Div.). Apr 1983. 80p. (EPRI-NP—2372; GEAP—24936). NTIS, PC A05/MF A01 - GPO $5.50. Order Number DE83901796.

Separate effects and system response tests conducted in the Single Heated Bundle (SHB) facility have produced data for evaluating: (a) low flow core spray heat transfer; (b) bundle bottom reflood heat transfer; (c) channel to bypass heat transfer; and (d) BWR refill-reflood controlling phenomena. These data support model development and qualification. Transient Loss of Coolant Accident (LOCA) experiments conducted in the SHB test facility have demonstrated that an adiabatic bundle system, using steam injection to simulate vaporization, simulates the thermal-hydraulic system response of a heated bundle system. These tests which were conducted by subjecting the adiabatic bundle and then an electrically heated bundle to the same LOCA transients, confirm the application of the adiabatic steam injection technique to a large-scale test facility.

31766 **(NUREG/CR—2005-Rev.1) Checklist for evaluating emergency operating procedures used in nuclear power plants.** Brune, R.L.; Weinstein, M. (HPT, Inc., Thousand Oaks, CA (USA)). Apr 1983. Contract AC04-76DP00789. 30p. (SAND—81-7074-Rev.1). NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83012029.

This document described a checklist to be used by US Nuclear Regulatory Commission (NRC) Office of Inspection and Enforcement inspectors during their evaluation of emergency operating procedures. The objective of the checklist is to aid inspectors in identifying characteristics of the procedures that can lead to operator performance deviations. Explanations of the procedures evaluation criteria comprising the checklist are provided. Methods of performing the evaluations are described and suggestions for applying the checklist to increase the effectiveness of the inspection process are made. Revision 1 of the checklist, presented herein, is the result of a one-year field test by NRC inspectors in all five NRC regions. It incorporates improvements that were suggested by inspectors based on their experience with the checklist in performing evaluations of licensee procedures.

31767 **(NUREG/CR—2069-Rev.) Summary report on a survey of light-water-reactor safety systems.** Heddleson, F.A. (Oak Ridge National Lab., TN (USA)). Apr 1983. Contract W-7405-ENG-26. 355p. (ORNL/NSIC—181/R1). NTIS, PC A16/MF A01 - GPO. Order Number DE83010920.

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This report is a revision of NUREG/CR-2069, which described a survey that was performed for the Nuclear Regulatory Commission's Division of Risk Analysis. The purpose of the survey was to collect data on various safety systems for all operating commercial nuclear power plants and review this data for comparison

of plants and plant designer's techniques. Forty-seven plants (69 reactor units) were reviewed. This report contains an updated and corrected data file and six individual detailed studies of the safety systems.

31768 **(NUREG/CR—2634) Acoustically measured penetration profiles for a molten metallic pool into river-stone concrete.** Sutherland, H.J.; Hagen, S. (Sandia National Labs., Albuquerque, NM (USA); Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)). Dec 1982. Contract AC04-76DP00789. 34p. (SAND—82-0676). NTIS, PC A03/MF A01. Order Number DE83006120.

An acoustic pulse-echo technique has been used as part of the instrumentation package for the medium-scale (100 kg), metallic pool/concrete interaction tests that are in progress at Kernforschungszentrum Karlsruhe (KfK). The acoustic data provides real-time plots of the position of the melt-concrete interface and permits deductions about some of the conditions that exist at the interface. Penetration rates as large as 25 mm/min were observed.

31769 **(NUREG/CR—2743) Procedures for using expert judgment to estimate human-error probabilities in nuclear power plant operations.** Seaver, D.A.; Stillwell, W.G. (Decision Science Consortium, Inc., Falls Church, VA (USA)). Mar 1983. Contract AC04-76DP00789. 126p. (SAND—82-7054). NTIS, PC A07/MF A01 - GPO. Order Number DE83012116.

This report describes and evaluates several procedures for using expert judgment to estimate human-error probabilities (HEPs) in nuclear power plant operations. These HEPs are currently needed for several purposes, particularly for probabilistic risk assessments. Data do not exist for estimating these HEPs, so expert judgment can provide these estimates in a timely manner. Five judgmental procedures are described here: paired comparisons, ranking and rating, direct numerical estimation, indirect numerical estimation and multiattribute utility measurement. These procedures are evaluated in terms of several criteria: quality of judgments, difficulty of data collection, empirical support, acceptability, theoretical justification, and data processing. Situational constraints such as the number of experts available, the number of HEPs to be estimated, the time available, the location of the experts, and the resources available are discussed in regard to their implications for selecting a procedure for use.

31770 **(NUREG/CR—2744/2) Human-reliability data bank for nuclear-power-plant operations. Volume 2. A data-bank concept and system description.** Comer, M.K.; Kozinsky, E.J.; Eckel, J.S.; Miller, D.P. (General Physics Corp., Columbia, MD (USA); Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 176p. (SAND—82-7057/2). NTIS, PC A09/MF A01 - GPO. Order Number DE83012007.

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The US Nuclear Regulatory Commission (NRC) is conducting a research program to determine the need for a human-reliability data bank unique to the nuclear industry. This report, in describing a proposed data bank, focuses primarily on four requirements: human-performance data collection, treatment, structuring (storage), and retrieval. Four data-collection methods are proposed: three are extensions to existing systems [i.e., Licensee Event Reports (LER), Nuclear Plant Reliability Data System (NPRDS), and Plant Incident Reports (PIR)]; the fourth is a new system called the Nuclear Safety Reporting System (NSRS). Data treatment involves evaluating raw field data and data from other sources (e.g., training simulator, expert judgment, and performance modeling), and preparing them for entry into the data bank. Data structuring involves storage of data by equipment characteristics and human actions at the system, component, and individual control/display levels. Data retrieval uses a set of matrices based on the data-structuring taxonomy.

31771 **(NUREG/CR—2789) Pressure-vessel thermal shock at US Pressurized-Water Reactors: events and precursors, 1963-1981.** Phung, D.L. (Oak Ridge National Lab., TN (USA)). Apr 1983. Contract W-7405-ENG-26. 248p. (ORNL/NSIC—210). NTIS, PC A11/MF A01 - GPO. Order Number DE83010107.

This report searches for and analyzes events and precursors to events of pressure vessel thermal shock (PVTS) at US pressurized-water reactors (PWRs). The data base includes close to 16,000 licensee event reports of 47 PWRs, covering 329 reactor years (RYs) from 1963 through 1981. Ninety-nine events were found in half as many computer searches. Original reports and other published data on these finds were located and subsequently analyzed to extract information on severity, initiation sequences, causes, and frequencies. Five categories of severity were defined, with categories 0, 1, and 2 being considered insignificant and categories 3 and 4 being considered significant. In addition, an event of lower severity is considered a precursor to a higher severity event of the same cause and initiation sequence. An exhaustiveness analysis indicated that the 34 significant events may have covered two-thirds of all such events, while the 65 insignificant events may represent only 25% of all such events that took place in operating plants.

31772 **(NUREG/CR—3000) Large-scale exploratory tests of sodium/limestone concrete interactions.** Randich, E.; Smaardyk, J.E.; Acton, R.U. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 114p. (SAND—82-2315). NTIS, PC A06/MF A01 - GPO. Order Number DE83009310.

Eleven large-scale tests examining the interaction of molten sodium and limestone (calcite) concrete were performed. The tests typically used between 100 and 200 kg of sodium at temperatures between 723 K and 973 K and a total sodium/concrete contact area of $\sim 1.0 m^2$. The results show that energetic reactions can occur between sodium and limestone concrete. Delay times of less than 30 minutes were observed before the onset of the energetic phase. Not all tests exhibited energetic reactions and the results indicate that there is a sodium temperature threshold of 723 K to 773 K which is necessary to initiate the energetic phase. Maximum heat fluxes during the energetic phase were measured at 3.6×10^6 J/m²-s. Maximum penetration rates were 4 mm/min. Total concrete erosion varied from 1 to 15 cm.

31773 **(NUREG/CR—3100) RELAP5 assessment: PKL natural-circulation tests.** Thompson, S.L.; Kmetyk, L.N. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 57p. (SAND—82-2902). NTIS, PC 04/MF A01 - GPO. Order Number DE83010224.

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The RELAP5 independent assessment project at Sandia National Laboratories is part of an overall effort funded by the NRC to determine the ability of various system codes to predict the detailed thermal-hydraulic response of LWR's during accident and off-normal conditions. The RELAP5 code is being assessed at SNLA against test data from various integral and separate effects tests facilities. As part of this assessment matrix a series of natural circulation tests performed at the PKL facility have been analyzed. The results show that RELAP5 will qualitatively describe all modes of natural circulation (including reflux cooling), although there are several quantitative discrepancies.

31774 **(NUREG/CR—3119-Vol.1) Nuclear-power-safety reporting system: feasibility analysis.** Finlayson, F.C.; Ims, J. (Aerospace Corp., Los Angeles, CA (USA). Energy and Resources Div.). Apr 1983. 35p. (ATR—83(3818)-1ND-Vol.1). NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83901717.

The US Nuclear Regulatory Commission (NRC) is evaluating the possibility of instituting a data gathering system for identifying and quantifying the factors that contribute to the occurrence of significant safety problems involving humans in nuclear power plants. This report presents the results of a brief (6 months) study of the feasibility of developing a voluntary, nonpunitive Nuclear Power Safety Reporting System (NPSRS). Reports collected by the system would be used to create a data base for documenting, analyzing and assessing the significance of the incidents. Results of The Aerospace Corporation study are presented in two volumes. This document, Volume I, contains a summary of an assessment of the Aviation Safety Reporting System (ASRS). The FAA-sponsored, NASA-managed ASRS was found to be successful, relative-

ly low in cost, generally acceptable to all facets of the aviation community, and the source of much useful data and valuable reports on human factor problems in the nation's airways. Several significant ASRS features were found to be pertinent and applicable for adoption into a NPSRS.

31775 **(NUREG/CR—3140) Containment-sump test data.** Schmidt, W.H. (Sandia National Labs., Albuquerque, NM (USA)). Apr 1983. Contract AC04-76DP00789. 68p. (SAND—82-2985). NTIS MF A01 - GPO $5.00. Order Number DE83012112.

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The containment-sump becomes a vital part of the nuclear reactor emergency coolant system in the event of a loss-of-coolant accident (LOCA). Alden Research Laboratory, under contract to Sandia Laboratories, conducted an extensive series of full-scale containment sump tests over a matrix of potential sump design and coolant flow conditions. Over 3100 sets of test data were produced. These data were sent to Sandia on computer disc packs. Computer programs were written to read the Alden test data, transfer the data to a 9-track computer tape, and produce both microfiche listings and time dependent plots of the data. This report describes the test data and the data formats, lists the computer programs developed to handle the data and tells how the data may be obtained for use by interested persons.

31776 **(NUREG/CR—3184) PBF LOCA test LOC-6 fuel-behavior report.** Broughton, T.M.; Vinjamuri, K.; Hagrman, D.L.; Golden, D.W.; MacDonald, P.E. (EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 66p. (EGG—2244). NTIS, PC E05/MF A01 - GPO. Order Number DE83012115.

Includes 9 sheets of 48 and 24x reduction microfiche.

This report presents the results of Loss-of-Coolant (LOC) Test LOC-6, conducted in the Power Burst Facility at the Idaho National Engineering Laboratory by EG and G Idaho, Inc., for the US Nuclear Regulatory Commission. Postirradiation examination results are included, together with the results of thermal-hydraulic and fuel behavior calculations using the RELAP4 and FRAP-T6/BALON-2 computer codes. Two of the four light water reactor type fuel rods ballooned and ruptured during the test. Peak cladding temperatures at the rupture locations were high in the alpha phase (1066 and 1098°K). The effects of initial rod internal prepressurization and prior irradiation were investigated during the experiment. The effect of rod prepressurization was found to be significant, and, for burnups of about 17,000 MWd/t, prior irradiation increased cladding circumferential strains at failure.

31777 **(NUREG/CR—3216) Heissdampfreaktor (HDR) steel containment vessel and flood water storage tank structural dynamics test.** Gorman, V.W.; Arendts, J.G.; Thinnes, G.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 105p. (EGG—2249). NTIS, PC A06/MF A01 - GPO. Order Number DE83010905.

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This report documents the results of mechanical inertance tests conducted on two vessels at the Heissdampfreaktor (HDR) facility located 25 km east of Frankfurt, West Germany. The specific purpose of the tests was to determine the modal properties (frequencies, mode shapes, and associated damping ratios) of the test vessels over a frequency range of 1 to at least 33 Hz using either an impulse hammer or shakers as a source of input excitation. Test vessel responses, measured by accelerometers, were processed by a digital based modal analyzer to obtain the modal properties. The results of these tests are intended for use by the US Nuclear Regulatory Commission (NRC) in developing standards for modeling such vessels and to comply with the guidelines of Appendix B, Section III of 10 CFR 50 concerning verification of mathematical models.

31778 **(NUREG/CR—3255) Analysis of reinforced-concrete containment vessels with nonlinear shearing stiffness.** Conley, C.H.; White, R.N.; Gergely, P. (Cornell Univ., Ithaca, NY (USA). Dept. of Structural Engineering). Apr 1983. 109p. NTIS, PC A06/MF A01 - GPO $5.50. Order Number DE83901711.

The purpose of this research was to gain improved understanding of the behavior of cylindrical reinforced-concrete containment vessels subjected to combined internal pressure and seismic loading. This research follows an experimental research program in which reinforced concrete panels were loaded with combined in-plane tension and shear. The panels were behavioral models of a segment of the containment vessel. The panel test results indicated that the cracking induced by internal pressure and seismic shear will cause a large reduction in containment stiffness. This implies that the containment may experience larger than anticipated displacements and liner stresses, and that there may be stress redistributions that could lead to overstress in regions of the vessel where current analyses predict small stresses. This research addresses these uncertainties.

31779 **(NUREG/CR—3267) Similarity analysis and scaling criteria for LWRs under single-phase and two-phase natural circulation.** Ishii, M.; Kataoka, I. (Argonne National Lab., IL (USA)). Mar 1983. Contract W-31-109-ENG-38. 49p. (ANL—83-32). NTIS, PC A03/MF A01 - GPO. Order Number DE83011355.

Scaling criteria for a natural circulation loop under single phase and two-phase flow conditions have been derived. For a single phase case the continuity, integral momentum, and energy equations in one-dimensional area average forms have been used. From this, the geometrical similarity groups, friction number, Richardson number, characteristic time constant ratio, Biot number, and heat source number are obtained. The Biot number involves the heat transfer coefficient which may cause some difficulties in simulating the turbulent flow regime. For a two-phase flow case, the similarity groups obtained from a perturbation analysis based on the one-dimensional drift-flux model have been used. The physical significance of the phase change number, subcooling number, drift-flux number, friction number are discussed and conditions imposed by these groups are evaluated. In the two-phase flow case, the critical heat flux is one of the most important transients which should be simulated in a scale model. The above results are applied to the LOFT facility in case of a natural circulation simulation. Some preliminary conclusions on the feasibility of the facility have been obtained.

31780 **(OEFZS—4157) American 'severe fuel damage program'.** Sdouz, G. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna). Mar 1982. 62p. (In German). (RS—200/82). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83700343.

The TMI-2 accident has initiated a new phase of safety research. It is necessary to consider severe accidents with degraded or molten core. For NRC there was a need for an improved understanding of this reactor behaviour and the 'Severe Fuel Dage Program' was initiated. Planned are in-pile experiments in PBF, NRU and ESSOR and in addition separate effects tests and results from TMI-2. The analytical component of the program is the development of different versions of the code SCDAP for the detailed analysis during severe accident transients.

31781 **(SAND—83-0600) Light-water-reactor safety-technology program. Quarterly report, October-December 1982.** (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 28p. NTIS, PC A03/MF A01. Order Number DE83011374.

Information is presented concerning risk methods utilization; man-machine interaction; safety data; utility training; information systems; and integrated approach demonstration.

31782 **(SAND—83-0851C) Nuclear-power-plant design concepts for sabotage protection. Phase 2.** Ericson, D.M. Jr. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 15p. (CONF-830416—2). NTIS, PC A02/MF A01. Order Number DE83009690.

From American Nuclear Society workshop on power plant security; Savannah, GA, USA (24 Apr 1983).

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This program has examined plant design changes for their impact upon sabotage protection. Given the compartmentalization

present in current generation plants similar to SNUPPS and BWR 6 and the level of physical protection assumed in this study, even drastic changes in design don't significantly affect the protection against an external threat. In Phase 2 a systems ranking methodology was developed which can be used in both safety and sabotage studies. Damage control measures can be used in sabotage and accident mitigation. However, it is clear from these studies that to be effective, damage control must use installed equipment, and significant portions of that must be available in a very short time following an incident. Insider protection is a difficult task, requiring the integration of a number of techniques to be effective. Component level vulnerabilities can be reduced by careful design, but they can not be eliminated.

31783 **(SRD-R—251) GASEX 1: a general one-dimensional code for gas cloud explosions.** MacKenzie, J.; Martin, D. (UKAEA Risley Nuclear Power Development Establishment, Culcheth. Safety and Reliability Directorate). Jan 1983. 36p. United Kingdom Atomic Energy Authority, Wigshaw Lane, Culcheth Warrington, England.

This report describes the computer code GASEX1 which is used for gas cloud explosions. The emphasis of this report is on the model used and how it is written in a finite difference form for implementation in the code. No details of the actual coding are given. The input required to run the code and the form of the output are also described.

31784 **Application of system reliability analysis for the study of reactor seismic safety.** Cummings, G.E. (California Univ., Livermore (USA). Lawrence Livermore National Lab.). *Nuclear Engineering and Design;* 71: No. 3, 341-344(Aug 1982).

Presented at the 3. international seminar on the reliability of nuclear power plants.

An application of system reliability analysis techniques to answer reactor seismic safety questions constitutes a part of the Seismic Safety Margins Research Program being conducted by Lawrence Livermore National Laboratory for the US NRC. Both systems and structural analysis techniques are being employed to calculate failure and radioactive release probabilities in an effort to provide insights into the seismic safety of nuclear power plants. An event-tree/fault-tree model of a nuclear power plant has been constructed and is being used to calculate these probabilities. Failure data for use in this model is generated (in part) from responses calculated by structural analysis codes using earthquake time histories as forcing functions. These responses are applied to fragility functions to determine component and structural failure probability input for the fault trees. A description is given of the event-tree/fault-tree model that has been constructed and the computer code (SEISIM) developed to evaluate the model. Some preliminary results calculated using this model are presented.

31785 **Safety of nuclear power reactors.** MacPherson, H.G. (Oak Ridge Associated Universities, TN). pp 109-130 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Safety is the major public issue to be resolved or accommodated if nuclear power is to have a future. Probabilistic Risk Analysis (PRA) of accidental releases of low-level radiation, the spread and activity of radiation in populated areas, and the impacts on public health from exposure evolved from the earlier Rasmussen Reactor Safety Study. Applications of the PRA technique have identified design peculiarities in specific reactors, thus increasing reactor safety and establishing a quide for evaluating reactor regulations. The Nuclear Regulatory Commission and reactor vendors must share with utilities the responsibility for reactor safety in the US and for providing reasonable assurance to the public. This entails persuasive public education and information that with safety a top priority, changes now being made in light water reactor hardware and operations will be adequate. 17 references, 2 figures, 2 tables. (DCK)

31786 **Summary [of Work Session on Nuclear Power] with selected comments.** Brooks, H. (Harvard Univ., Cambridge, MA). pp 131-157 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Panelists agreed that nuclear power has such serious economical and political problems that some countries may eliminate it as an option, but they did not agree on the causes of the problems. The panel outlined 11 developments (including economic growth, new oil disruptions, and improved nuclear safeguards) that would be helpful in revitalizing the nuclear industry. A review of technical and institutional issues covers the comparative economics and risks of nuclear power, nuclear fuel resources, small reactors for developing countries, spent fuel management and reprocessing, proliferation, public participation, and advanced technologies. From their conclusions, the panel recommended improvements in international reporting and risk assessment, stabilized regulations, safeguards reform, standardized design, and better public information and input. (DCK)

25 ENERGY STORAGE

2505 Flywheels

31787 **(UCRL—15523-Pt.1) Composite-flywheel durability and life. Part I. Test program.** Kulkarni, S.V.; Reifsnider, K.L. (Lawrence Livermore National Lab., CA (USA)). Sep 1982. Contract W-7405-ENG-48. 40p. NTIS, PC A03/MF A01. Order Number DE83011279.

It has been demonstrated that flywheels made from composite materials are capable of storing energy at a significantly greater energy density than flywheels made from conventional metals. Composite flywheels which can store up to 80 Wh/kg have been successfully tested. In addition, composite flywheels are inherently safer for applications in vehicles and other devices since the failure of such wheels does not produce large pieces of heavy material that become dangerous projectiles, but generally produces a large number of pieces varying in size from chunks of delaminated laminates to dust and string- or straw-like matter. Composite flywheels are also thought to be more durable since composite materials generally perform very well under long-term and fatigue loading, frequently better than metals. However, the relatively limited experience that has been gained in using composite materials in high performance structures for long periods of time requires that special care be taken to verify the durability of any such design by experimental programs. An experimental program designed to establish the durability and life of the composite flywheel designs available at this time is presented. The objectives of the test program are as follows: to establish the durability and lifetime of flywheel rotors under conditions which include all of the essential details of the spectrum loading that rotors are likely to sustain as an energy storage device for various applications; to identify critical performance and durability characteristics which potentially limit the long term use of the rotor designs currently under development; and to develop test techniques and philosophies which can be used for fatigue testing of flywheels and to relate specimen data to rotor performance. Part I consists of the development of the test plan methodology.

31788 **(UCRL—15523-Pt.2) Composite-flywheel durability and life. Part II. Long-term materials data.** Reifsnider, K.L.; Jen, M.H.R. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)). Sep 1982. Contract W-7405-ENG-48. 339p. NTIS, PC A15/MF A01. Order Number DE83011278.

Large-scale use of modern high-modulus composite materials for engineering structures has occurred only fairly recently, over a period of approximately fifteen years. This situation presents a major obstacle to designers who wish to determine the absolute or comparative properties of various composite materials. While com-

pilations of elastic stiffness characteristics and quasi-static strength properties are available in compiled form for a number of common composite materials, it is much more difficult to obtain collected information concerning the long-term behavior, especially the fatigue behavior of composite materials and laminates. This data manual, which will be periodically updated, is an attempt to establish a beginning for such a compilation. While this attempt is modest, limited only to polymer matrix composite systems which are of interest or potential interest to energy storage systems, it does represent an effort to collect information which is otherwise widely scattered and to present the information in a manner which greatly facilitates comparison of properties between the various materials reported. The information is categorized in five sections which deal with graphite epoxy, glass epoxy, boron epoxy, Kevlar epoxy, and miscellaneous materials. Fatigue data were obtained from various sources and fit with a single relationship having the form S/S/sub ult/ = a+b/(log $_{10}$N)/sup x/. The curve that was found to be the best fit of the data in each case was plotted as a graph of normalized stress amplitude versus logarithm of the number of cycles to failure using the same scale (and plot size) for the ordinate and abscissa in each case in order to maximize the utility of these plots for comparison purposes. Other information that was available pertaining to the data and how it was obtained is listed.

2506 Thermal

31789 (CONF-8109203—, pp vp) **Thermal and electrical methods and applications for energy storage.** Ziegenbein, B. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The resolute and economic utilization of the described methods for storing thermal and electrical energy has undoubtedly considerable positive effects on our primary energy balance, i.e., improvement of the efficiency of existing plants, increasing the heat source temperatures for heat pump plants; application of cogeneration, e.g. decentralized thermal power plants; substitution of petroleum (oil central heating, combustion engines, etc.) by coal and nuclear energy, e.g., electric vehicles, solar hot water preparation; and superseding low-efficiency systems such as electrical night storage heating.

2509 Batteries

REFER ALSO TO CITATION(S) 31789, 31926, 32002, 32003, 32004, 32150

31790 (ANL/OEPM—82-5) **Development of aqueous batteries for electric vehicles. Summary report, October 1980-September 1981.** (Argonne National Lab., IL (USA)). May 1982. Contract W-31-109-ENG-38. 92p. NTIS, PC A05/MF A01. Order Number DE83012459.

This program conducts R & D on lead-acid, nickel/iron and nickel/zinc batteries for electric vehicles. Performance verification testing of contractor supplied cells, modules, and batteries is fperformed by ANL's National Battery Test Laboratory (NBTL). In the lead-acid system, the specific energy was increased from less than 30 Wh/kg to 41 Wh/kg at the C/3 rate; the specific peak power improved from 96 W/kg to 104 W/kg at the 50% state of charge; and a cycle life of over 481 deep-discharge cycles in continuing tests has been demonstrated. In the nickel/iron system, a specific energy of 48 Wh/kg, a peak power of 103 W/kg, and a life of over 740 cycles in ongoing tests was obtained. In the nickel/zinc system, specific energies of up to 68 Wh/kg, peak powers of 131 W/kg, and a life of 179 cycles was measured. Testing of 55 cells was completed. In addition, post-test analysis of failed batteries was carried out. Significant advances in testing capability were implemented, including the installation of a peak power test station, three environmental chambers, and computer-controlled load banks which simulate the power profiles imposed on a battery by an electric vehicle. Detailed charging and discharging studies have identified improved charging procedures which optimize battery capacity and efficiency. In fundamental electrode studies, neutron diffraction experiments on lead-acid battery active materials have revealed chemical changes in addition to electrochemical transformations; a relationship between charge efficiency and state-of-charge was established for nickel electrodes; and a model describing mass transfer characteristics at vibrating electrodes was developed. Models for predicting the thermal and electrical behavior of batteries were also developed. An evaluation of the availability and cost of critical battery materials was made. A preliminary assessment of the battery requirements for the electric hybrid vehicle was completed.

31791 (ANL/OEPM—83-2) **Review of membrane separators and zinc-nickel oxide battery development.** Bennion, D.N. (Brigham Young Univ., Provo, UT (USA). Dept. of Chemical Engineering). Oct 1980. Contract W-31-109-ENG-38. 102p. NTIS, PC A06/MF A01. Order Number DE83011663.

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After a discussion of membranes and their role in zinc-nickel oxide batteries, possible solutions are reviewed for problems related to membrane separators in these batteries. Experiments to characterize a membrane are also summarized. A bibliography is included to show what is being done in the field of battery research to develop practical membranes for use in Ni/Zn or Ag/Zn batteries. (LEW)

31792 (CONF-820217—10) **Lead-acid battery performance and technology in commercial electric-vehicle applications.** Weinlein, C.E. (Johnson Controls, Inc., Milwaukee, WI (USA). Globe Battery Div.). 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83010559.

From 9. energy technology conference; Washington, DC, USA (16 Feb 1982).

The advantages and performance goals of lead-acid batteries for use in electric vehicles are discussed. Various conditions which can shorten the life of an electric vehicle battery are described. (WHK)

31793 (CONF-820621—7) **Design of an efficient electrolyte circulation system for the lead-acid battery.** Thuerk, D. (Johnson Controls, Inc., Milwaukee, WI (USA). Globe Battery Div.). 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83010564.

From 30. power sources symposium; Atlantic City, NJ, USA (7 Jun 1982).

Application of lead-acid batteries to electric vehicle and other repetitive deep-cycle services produces a non-desirable state in the battery cells, electrolyte stratification. This stratification is the result of acid and water generation at the electrodes during cycling. Water, which is generated during discharge, rises to the electrolyte surface due to gravity differences, whereas the concentrated sulfuric acid generated during charge falls to the bottom of the container. With continued cycling, the extent of the stratification increases and prevents complete charging with low percentages of overcharge. Ultimately this results in extremely short life for the battery system. The industry presently overcomes the stratification problem by substantially overcharging the battery. This abusive overcharge produces gassing rates sufficient to mix the electrolyte during the end portion of the charge. The amount of recharge typically used to mix the electrolyte ranges from 120% to 140% of the prior discharge. Overcharge, even though it is required to eliminate stratification, produces the undesirable results related to high voltage and gassing rates. The design and operation of an electrolyte circulation system are described. (WHK)

31794 (CONF-821211—11) **Summary of aqueous mobile battery development.** Christianson, C.C.; Yao, N.P.; Rajan, J.; Miller, J.; Lee, J.; Choi, K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83010716.

From 5. DOE battery and electrochemical contractors' conference; Crystal City, VA, USA (7 Dec 1982).

Progress at ANL in developing improved aqueous battery technology for use in electric vehicles is briefly described. Research directed at improving the lead-acid, nickel/iron, and nickel/zinc technologies is emphasized. (WHK)

31795 (DOE/ER/10416—4) Nuclear magnetic resonance studies of ion motion in solid electrolytes. Annual report, June 1, 1982-March 31, 1983. Bjorkstam, J.L. (Washington Univ., Seattle (USA)). Jan 1983. Contract AT06-79ER10416. 10p. NTIS, PC A02/MF A01. Order Number DE83011460.

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An extensive investigation of a number of Li-Na beta-alumina crystals was carried out. It was found that the reaction of beta-aluminas with water involves partial substitution of M^+ by H_3O^+ (or H^+) and carbonation at the crystal surface; i.e., reaction of a hydroxide with CO_2. NMR spin-lattice relaxation data have been collected over the 4.2-100°K temperature interval at several frequencies for a number of beta-aluminas. Extensive efforts on the NMR investigation of lithium, proton, and deuteron nuclei in both normal and deuterated single crystals of lithium-iodide-monohydrate are reported. An extensive investigation of the thermodynamics and cation exchange properties of the AgI: Ag_2O-B_2O_3 glasses has been performed. Cation exchange techniques to produce new vitreous electrolytes were not successful. (LEW)

31796 (DOE/ER/10416—T1) Ion dynamics and ordering in β and β''-alumina solid electrolytes. Bjorkstam, J.L. (Washington Univ., Seattle (USA). Dept. of Electrical Engineering). 1982. Contract AT06-79ER10416. 33p. NTIS MF A01. Order Number DE83012444.

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Using as a vehicle the beta and beta"-alumina solid electrolytes, several complicated local and long range ionic motion and ordering phenomena are illustrated which can be studied through temperature dependence of NMR spin-lattice relaxation, line narrowing, and spectral changes. Emphasis is on the necessity to use appropriate models. (LEW)

31797 (DOE/ET/25502—4) Oxygen electrodes for energy conversion and storage. Final annual report, 1 October 1980-31 January 1981 and 15 July 1981-31 May 1982. (Diamond Shamrock Corp., Painesville, OH (USA). Electrolytic Systems Div.). 1982. Contract AC02-77ET25502. 393p. NTIS, PC A17/MF A01. Order Number DE83010650.

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In October, 1977, a four-year project was initiated by the Diamond Shamrock Corporation (DSC) and Case Western Reserve University (CWRU) on the development of high performance oxygen electrodes for a spectrum of applications including industrial electrolysis, metal-air batteries, and fuel cells. The research at CWRU emphasizes the development of more effective electrocatalysts for O_2 reduction and optimization of electrode structures (particularly O_2 cathodes) for utilizing these catalysts. The research approach involved the development of a predictive base through the understanding of the relation of the pathways and kinetics of the electrode reactions to the surface electronic and morphological properties of the electrocatalysts. The DSC group has been concerned principally with the evaluation of catalysts recommended by CWRU as well as by their own staff and the fabrication of electrode structures for these evaluations. A specific objective of the portion of the work in cooperation with DSC has been the achievement of high performance O_2 cathodes now used in the generation of chlorine and caustic. CWRU has examined over 100 catalyst systems with the choice influenced on the basis of the anticipated interaction of O_2 with their surface. Many have shown considerable activity in alkaline and a few in acid electrolytes. Particularly exciting are the transition metal macrocyclic complexes and some partially pyrolyzed transition metal macrocyles. High catalytic activity is also obtained with pyrochlores, some spinels and perovskites and some of the carbons. Mechanistic studies have identified pathways relying much on kinetic data obtained with a modification of the rotating ring-disk technique developed at Case involving the highly dispersed catalyst on a carbon/graphite support in alkaline electrolytes. Other fundamental developments are included.

31798 (EPRI-EM—2937) Roughness evolution and dendritic growth in zinc electrodeposition from halide electrolytes. Final report. Landau, U. (Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Chemical Engineering). Mar 1983. 153p. NTIS, PC A08/MF A01. Order Number DE83901992.

Evolution of rough or dendritic surface texture during electrodeposition often restricts the capacity of rechargeable batteries by limiting the thickness of the plated layer, thereby imposing economic and operating limitations on high energy storage systems such as the zinc-halogen batteries. This technologically important phenomenon has so far been treated mostly empirically. A comprehensive model for roughness evolution in electrodeposition, taking into account the combined effects of transport by diffusion and convection, reaction kinetics and the surface energy is reported here. Critical overpotentials and induction times for roughness initiation, and propagation of roughness elements are determined. Morphological stability analysis explains why certain electrodes remain smooth whereas others evolve dendrites, and defines conditions for smooth deposition. Once roughness evolution is indicated, the complete growth history of the nodules is provided in terms of the current density and the applied potential, the convective flow, chemical composition and the macroscopic and microscopic geometry. The density and distribution of roughness elements evolving over extended electrodes subject to non uniform flow and potential fields are modelled. Severe localized dendritic growth is indicated, well below the limiting current, under certain conditions. Experimental measurements in the electrodeposition of zinc and copper, and reported observations in the literature, are in excellent agreement with the theoretical predictions.

31799 (EPRI-EM—2947) Corrosion of chromium-coated steel in sodium polysulfide environments. Final report. Wicker, A. (Compagnie Generale d'Electricite (CGE), 91 - Marcoussis (France)). Mar 1983. 110p. NTIS, PC A06/MF A01. Order Number DE83901975.

This project had the broad objective of evaluating the behavior of certain chromium-rich coatings on low-carbon steel in sodium polysulfide environments typical of those found in sodium-sulfur cells. Raw materials were characterized before coating, and three values of carbon content were chosen: 0.013% (Armco iron), 0.088% (XC10 steel) and 0.22% (XC12 steel). Three types of coating were examined (i) chromized in three thicknesses (30, 60 and 90 μm), (ii) chromium electroplating in three thicknesses (50, 100 and 200 μm) and (iii) chromium electroplating followed by a diffusion step at higher temperature (around 1000°C) in three thicknesses (50, 100 and 200 μm). The various coatings were characterized with regards to microstructure, hardness, and concentration profile of chromium. A corrosion cell for static test was designed consisting of the sulfur compartment of a large Na-S cell. Five test furnaces at different temperature were used (300 - 325 - 350 - 400 and 440°C). Test durations were in the range of 3 to 12 months. Dynamic tests were made using sodium-sulfur cells and special cells without a polysulfide environment. All the above tests have shown that chromizing is suitable for working temperatures below 350°C. For higher temperatures, chromium electroplating followed by a diffusion step exhibits satisfactory behavior.

29 ENERGY PLANNING AND POLICY

REFER ALSO TO CITATION(S) 31212, 31213, 31997, 32490

31800 (CONF-8009303—Exc.) Fundamental necessities for a sound economy; What does energy mean for the Swiss economy. von Planta, L.; Borgeaud, P. (Schweizerischer Handels- und Industrie-Verein, Zurich). Oct 1980. 35p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901179.

From 110. regular meeting of the Schweizerischer Handels- und Industrie-Verein; Zurich, Switzerland (19 Sep 1980).

Some principles of Swiss energy policy are depicted, with the related problems of governmental, economic imperatives, energy research and energy taxes being dealt with. The author unambiguously votes for a market-orientated energy concept.

31801 **(DOE/EIA—0149(82)) EIA publications directory: a user's guide.** (National Energy Information Center, Washington, DC (USA)). Apr 1983. 106p. NTIS, PC A06/MF A01. Order Number DE83012022.

The purpose is to provide access to EIA publications. This issue contains abstracts of publications released for printing in 1982. The directory includes a subject index, a title index, and a report number listing for all 1982 EIA publications as well as complete information on how to order these publications. The abstracts of the publications are arranged by broad subject categories such as Coal Products, Petroleum, Natural Gas, and Energy Analysis and Modeling. These subject categories are further divided into subcategories.

31802 **(DOE/IG—0146) Proposed changes in interest rate criteria and the amortization method for repayment of federal hydro-power investments.** (USDOE Office of Inspector General, Washington, DC). 26 Jan 1981. 36p. USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830.

Report to The Secretary.

Where review of government policies followed in charging interest on unrepaid investment (32% of total program cost) disclosed those interest rates were less than cost to the US Treasury to borrow funds to finance federal programs, IG recommended consideration of policy changes to recover interest costs on new project more closely to true costs, i.e., perhaps use of a weighted average over entire construction period. Also, a policy to amortize all unrepaid investments on a simultaneous basis should be developed. Comments are appended from the Assistant Secretary for Resource Applications, and from the Director of the Office of Power Regulation, Federal Energy Regulatory Commission. (PSB)

31803 **(DOE/IG—0152) Excessive interest cost of letter-of-credit accounts.** (USDOE Office of Inspector General, Washington, DC). 6 Apr 1981. 28p. USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830.

Report to The Secretary.

Where review disclosed that Treasury interest costs were higher than necessary and most banks administering these accounts were overcompensated for their services because funds provided to the banks were excessive in relation to the services that they provided, the IG recommended that DOE (a) obtain reports from banks and contractors in order to determine the adequacy of banks' compensation, and (b) ensure compliance with Treasury directives. Other measures are also recommended that will enhance the benefits of the letter-of-credit system. Draft comments are provided from the Controller and the DOE San Francisco and Richland Operations Office. Corrective Measures are reported. (PSB)

31804 **(DOE/IG—0153) Advanced Isotope-Separation Program for uranium enrichment.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 23 Sep 1981. 15p. K. Order Number DE83008196.

Where the selection date for the best of three advanced isotope separation processes appeared to be premature by mid-fiscal 1982, the IG recommended that all three processes be continued through the development module stage, which would represent a postponement of one year due to the recent issuance of selection criteria. (PSB)

31805 **(DOE/IG—0158) Follow-up inspection of the technical-evaluation process in the biomass-energy-systems program.** (USDOE Office of Inspector General, Washington, DC). 15 May 1981. 28p. USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830.

Report to The Secretary.

This report provides our assessment of corrective actions that have been taken in response to IG recommendations in a report dated December 21, 1979. In response to the report, the Director of Procurement and Assistance Management initiated DOE Order 4210.4, which was issued on June 20, 1980. DOE Order 4210.4 required each program office to establish its own procedures for reviewing unsolicited proposals and specified the federal and DOE procurement and assistance regulations with which the procedures must comply. The follow-up inspection found that the Biomass Energy Systems Division has not yet established procedures that are required by DOE Order 4210.4. IG feels that the issue of DOE Order 4210.4 was a significant management improvement. Compliance is now required.

31806 **(DOE/IG—0161) Appropriate-Technology Small-Grants Program, Chicago Operations Office.** (USDOE Office of Inspector General, Washington, DC). 29 May 1981. 21p. USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830.

Report to The Secretary.

Grants totaling $1,290,837 were awarded during FY 1979 to 60 program participants in Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin. Review showed that some grantees misused grant monies and did not comply with grant provisions primarily due to insufficient on-site monitoring of the grantees' progress and expenditures. Recommendations to achieve the objectives of the program were: more timely and systematic monitoring; curtail or stop funds for grant projects with unsatisfactory progress or of questionable merit; substantiate expenditures by grantees before disbursing grant funds; and consider increasing program management capability by staffing alternatives. Corrective action taken or planned by the Manager/Regional Representative is identified in an appendix. (PSB)

31807 **(DOE/IG—0164) Excessive costs of drill rigs acquired by the strategic petroleum reserve office-New Orleans, Louisiana.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 1 Jul 1981. 30p. K. Order Number DE83008318.

Report to The Secretary.

Review showed that the program office incurred excessive costs of at least $7.1 million by hastily acquiring inadequate, often defective, drill rigs in 1978. Since Phase III drilling operations are planned to begin in FY 1982, IG recommended that program officials: emphasize competitive procurement; make a thorough analysis of data before contract decisions; be more flexible in adjusting schedules for cost savings; and reevaluate the inventory of government-furnished equipment provided to contractors. Remedial action on most of the recommendations has been initiated and comments on the draft of this report by the Acting Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness are appended.

31808 **(DOE/IG—0169) Investigation into allegations of violations of Executive Order 12036.** (USDOE Office of Inspector General, Washington, DC). 28 Aug 1981. 39p. USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830.

Report to The Secretary.

The first section gives background information on the DOE-initiation of this investigation and on the National People's Action Countil (NPAC), the National Training and Information Center (NTIC), and their organizational relation to DOE. Findings, in the next section, address events that bear directly on allegations presented in news articles: events giving rise to and surrounding the allegation that an order was given to send DOE employees as unidentified operatives to attend NPAC and NTIC sponsored meetings. The second finding concerns the actual attendance and participation by DOE employees in such meetings. The final section presents conclusions plus the opinion of Counsel to the Intelligence Oversight Board and DOE's Office of General Counsel that no actual violation of law or regulation appeared evident. (PSB)

31809 **(NZERDC-P—65) Evaluation of teleconferencing facilities.** (New Zealand Energy Research and Development Committee, Auckland). Sep 1982. 44p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901630.

The results are given of the first phase planning of a project directed towards: organizing a demonstration network for teleconferencing, to link the main universities with which NZERDC is working and the Ministry of Energy in Wellington; monitoring the use of the demonstration teleconferencing facility, this to include an assessment of the costs and benefits in terms of transport savings. It comprises a prefeasibility study intended: to outline teleconferencing options which are presently available in New Zealand; to describe their possible implementation by NZERDC; to indicate their costs, and to relate these costs to equivalent travel needs. (PSB)

2901 Energy Analysis And Modeling

REFER ALSO TO CITATION(S) 31161, 31164, 31171, 31823, 31828, 31837, 31861, 31862, 31892, 31895, 31908

31810 **(EUR—7713-EN) Energy-flow optimization model - Ireland.** Killen, L. (National Board for Science and Technology, Dublin (Ireland)). 1982. 82p. European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

National case studies carried out using EFOM-12-C in Ireland are presented. The European Community's heavy dependence on imported energy, and its dependence on oil in particular, has been widely discussed, and the vulnerability of the Community in this situation has been evident in recent years. Supply interruptions such as that experienced in 1973-1974, and more recently in 1979, are now a fact of life, and it is essential to examine the effects of these crisis situations. These case studies determine how the national energy systems can accommodate shortages or rationings of imported energy. The structure of EFOM is highly suitable for studying the effects of rationing of any energy source, imported or indigenous.

31811 **(EUR—8322-EN) Candidate technologies to relieve the European energy system.** Droste, F.P.M. (Technische Hogeschool Twente, Enschede (Netherlands)). 1982. 104p. European Communities Information Service, 2100 M Street NW, Suite 707, Washington, DC 20037.

Newly developed energy technologies are introduced as part of the energy model representing the Dutch energy system, to examine their potential impact on the future energy supply of the Netherlands. Methods to deal with specific Research and Development effects are described together with a procedure to obtain a ranking among the technologies considered. Several cases are presented in detail.

31812 **(EUR—8361-EN) Reestimation of the EDM in the Netherlands and the reference case. Final report.** (Cambridge Econometrics Ltd. (UK)). 1983. 84p. European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

Results consist of a re-estimated energy demand model for the Netherlands using data supplied by the Economic Institute of Tilburg; the discussion and presentation of the coefficients of the model for the Netherlands; and a reference case study for the Netherlands using the re-estimated model. The second part describes the analysis and compares results with those of the Dutch Central Planning Bureau. The determination of share equations and aggregate demand stages are discussed. (PSB)

31813 **(EUR—8363-EN) Development hypotheses in the countries of the European Community and energy consumption in Italy in the medium term. Final report.** Merzagora, N. (Comitato Nazionale per l'Energia Nucleare, Rome (Italy). Direzione Centrale Studi dell'Energia Nucleare e delle Energie Alternative (ENEA)). 1983. 94p. European Communities Information Service, 2100 M Street NW, Suite 707, Washington, DC 20037.

The pattern of energy consumption in Italy up to 1990 was analyzed. The results constitute the first of a multinational exercise with the medium-term energy models EURECA, EXPLOR and EDM, and represent a cooperative European Community effort. The impact of an increase in energy prices on the economies and energy consumption of the European Community countries was studied as related to the macroeconomic development scene. (PSB)

31814 **(IKE—4-109) Game theory analysis of long-term planning in energy policy.** Lutz, B.; Ruehle, R. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Aug 1982. 14p. (In German). (CONF-8208126—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750421.

From 7. symposium on operations research; St. Gallen, Switzerland (19 Aug 1982).

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As exemplified by a conflict of interests in energy policy this study shows how an immense quantity of strategies - which, according to conventional, strict procedures of game theory, is not accessible to numerical calculation - can still undergo a systematic analysis by means of a heuristic method. In order to achieve a solution which is more related to reality available models of game theory are expanded and implemented into a comprehensive data bank system together with known methods in the form of modular units. Thus and by the help of suitable analyzing techniques, by division of the conflict model into subsystems and handy data organizations optimal structures of priority for all feasible actions can be forecast.

31815 **(NP—3901181) Energy demand and social patterns in India.** Mueller, T. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Wirtschaftswissenschaften). 13 Feb 1981. 115p. NTIS (US Sales Only), MF A01. Order Number DE83901181.

Microfiche only, copy does not permit paper copy reproduction; Thesis.

After having presented the recent development of energy consumption in India the model of MUSEDEV (Modeling Useful Energy for a Developing Country) is described which registers the complex linkage between energy consumption and socio-economic development. Finally, an analysis of the factors influencing the energy consumption without being in direct relation to it is made. The summary of the results shows the possible development of a social model in dependence of the energy consumption until the year 2025. The example of India was taken as a model for the development of a developing country. The forecast has a model character. It was developed with various instability factors being excluded (political changes, technological breakthroughs, immediate environmental changes).

31816 **Review of validation and assessment issues of energy models.** Gass, S.I. (Univ. of Maryland, College Park). pp 105-122 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

This paper reviews some of the background and recent activities related to the validation and assessment of energy models. Concern is mainly with models that are complex in terms of their: large number of variables and relationships; scope and range of the problem environment; data requirements; required assumptions; need to be expressed in computer programs; and solution interpretations. The models of interests are those that have been developed as aids to governmental and industrial policymakers in guiding this country's energy future. 42 references, 1 figure.

31817 **Evaluation of long-term forecasting models.** El-Hodiri, M. (Univ. of Kansas, Lawrence). pp 123-133 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The focus of this paper is directed at the problem of evaluating long-term forecasting models from the point of view of government decision-making. Emphasis is on models that forecast long-term availability of energy. The author proposes an innovative approach to model evaluation based upon recent research involving the maximal root properties of positive matrices, and outlines the significant potential gains such a method may bring to the long-term forecasting arena. Analysis of the general forecasting problem under a reasonable set of conditions underlines the need for periodic revision of forecasts, a result consistent with intuitive notions of good planning practice. The author chose to tackle the uncertainty problem in a novel way by attempting to apply the relatively recent Theory of Evidence to the long-term forecasting problem. Because of the embryonic nature of this theory and its complexity, one might question whether it is appropriate to attempt such an application. However, it is easy to lose sight of the potential utility of such a method by focusing on the internal intricacies. The author has emphasized that, if after additional research, it proved to be an

appropriate tool, it would be one additional method which could be employed by policy makers to choose among the usually disparate set of energy forecasts generated by the various models in use.

2902 Economics And Sociology

REFER ALSO TO CITATION(S) 31074, 31160, 31166, 31204, 31206, 31854, 31862

31818 (DOE/EI/70052—T1) Pricing underemployed capacity in a linear economic model. Technical report SOL 79-2. Dantzig, G.B.; Jackson, P.L. (Stanford Univ., CA (USA). Systems Optimization Lab.). Feb 1979. Contract AT03-76EI70052. 17p. NTIS, PC A02/MF A01. Order Number DE83009915.

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One of the difficulties in relating the shadow prices of a linear economic model to their counterparts in the real economy being modelled is the assumption of perfect competition. Under this assumption competition would force the price of any resource in excess supply down to zero. In real economies, however, owners of capacity routinely receive a return even when that capacity is underemployed, precisely because competition is imperfect. We present a method for determining a stable system of shadow prices consistent with an absence of competition among the owners of slack capacity and show that this implies non-zero prices on all resources, regardless of excess supply.

31819 (NZERDC-P—72) Effect of disruptions of New Zealand's energy supply on New Zealand society. Lewthwaite, N.B.; Porter, D.J. (New Zealand Energy Research and Development Committee, Auckland). Oct 1982. 78p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE83901661.

This report presents a perspective of energy crises. Disruptions to supply of energy are not seen as marginal changes to the quantity or price of energy available but as major events which threaten to disrupt, not merely inconvenience existing arrangements. Events during the 1970's are reviewed to illustrate the structural changes that these events have led to. In this light energy administration in New Zealand is reviewed and a framework for selection of case studies and some research methods are suggested. The focus of the report is on crises and the response of institutions and this focus indicates that should genuine disruption to major energy supply occur, and none has occurred in the last decade, then important though technology is to the adjustment, the social, political and institutional aspects are likely to be dominant.

31820 (P—110-82-004) Regulatory boundaries and the development of alternative energy sources. Final report. Kahn, E.; Merritt, M. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Nov 1982. 171p. California Energy Commission, Publications Unit, 1516 Ninth Street, Sacramento, CA 95814.

The development of alternate energy sources is viewed in the context of price and performance uncertainties. Particular emphasis is placed on the role of regulation in facilitating this development. Organizational alternatives for utility activity are reviewed. The advantages and disadvantages of organizing diversification activities as internal divisions, subsidiaries or holding company affiliates are examined from the perspective of regulatory control. The structural characteristics of the electric utility industry are examined by comparison with telecommunications and by reviewing various proposed structural reforms. Decentralized generation projects and utility conservation programs are examined generically. Various stabilization policies which can make such projects more financially viable are reviewed. Benefits and limits of conservation programs for both consumers and utility shareholders are discussed. Federal tax and PURPA policies affecting utility development of small power projects are discussed, and potential interactions with conservation and conventional supply planning are reviewed. An incremental form of deregulation coupled with utility conservation activity is suggested as a compromise between consumer and shareholder interests. The difficulties attendant upon such a linkage policy are enumerated.

31821 American energy and mineral industry involvement in housing. Metz, W.C. (Brookhaven National Lab., Upton, NY). *Minerals and the Environment;* 4: No. 4, 131-140(Dec 1982). Contract AC02-76CH00016.

After a lapse of almost two decades, US energy and mining companies are once again involving themselves with worker housing. Reinvolvement began in the 1970s. It is in response to a recognition of the fiscal consequences of project delays and an industry responsibility to both workers and project area communities. If differs from the heavy reliance on company communities. It differs from the heavy reliance on company towns which were prevalent in the US during the 19th and early 20th Centuries. Industry involvement now relies not only on supply, but on stimulation. A greater variety of housing initiatives is being utilized and a company must carefully select the housing initiative best suited to its circumstances. These initiatives need to be guided by the following set of decision guidelines: (1) housing function; (2) housing user; (3) housing type and quantity needs; (4) monetary expectations; (5) role of the industry; (6) housing unit location; (7) responsibilities after housing is completed; and (8) amenities and community sharing. Then, housing involvement must be reviewed in light of past and present industry experiences. Innovative ideas need to be evaluated with respect to proven initiatives, as well as their presumed goal and potential for success. 17 references, 2 tables.

31822 Socio-economic impact management: programme design and implementation considerations. Leistritz, F.L. (North Dakota State Univ., Fargo); Halstead, J.M.; Chase, R.A.; Murdock, S.H. *Minerals and the Environment;* 4: No. 4, 141-150(Dec 1982).

While larger mineral-resource development projects offer new jobs and provide a stimulus to the economy of the area where they are sited, they may also pose problems in rural areas associated with rapid population growth. The purpose of an impact management program is to anticipate and alleviate project effects that are generally perceived as undesirable and to enhance effects that are beneficial to site-area communities. While the effective management of project effects is the end towards which all impact assessment efforts are directed, an integrated approach to impact management has been notably lacking. This paper suggests a systems framework for meeting this need by: (1) reviewing the need for impact management efforts; (2) discussing the objectives of, and considerations in, designing impact management programs; (3) presenting a conceptual framework for, and key components of, such a program; and (4) suggesting an approach for implementing such a system as an integral part of the project development process. 34 references, 1 figure, 2 tables.

31823 Intergenerational ethics and the depletion of fossil fuels. Schulze, W.D.; Brookshire, D.S. (Univ. of Wyoming, Laramie). pp 159-178 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The consequences of incorporating concern for the well-being of future generations in the long-term decision models used to choose among energy strategies are discussed. The authors point out the inadequacy of standard cost-benefit techniques and models in dealing with the potentially catastrophic social and environmental costs of various energy options. They suggest the alternative approach of investigating the logical implications of the adoption of four ethical principles of choice: (1) utilitarian; (2) totally egalitarian; (3) totally elitist; and (4) Christian. 1 table.

31824 Investments for municipal infrastructure in energy-impacted communities. Arundale, C.J.; Cummings, R.G.; Mehr, A.F. (Univ. of New Mexico, Albuquerque). pp 211-226 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The authors report on research in whcih they analyze the probable significant requirements for municipal infrastructure additions associated with the increase or creation of local energy-industry activities. In particular, forecasts of various energy models have led to predictions of alternative energy development through massive expansion of coal, oil shale, and other resource mining in the Rocky Mountain region. The authors tend to see the problems of boomtowns largely in terms of the logistics of providing for the direct impacts of the increased population. The objective is to determine the optimal investment time path in such infrastructure to counteract the various problems likely to accompany the boomtown phenomenon. 3 figures, 1 table.

31825 **Politics of oil and revolution in Iran.** Bakhash, S. Washington, DC; The Brookings Institution (1982). 42p. (DOE/PE/70267—T2). The Brookings Institution, 1775 Massachusetts Avenue, NW, Washington, DC 20036. Contract AC01-80PE70267.

Elements of continuity and change in Iran's post-revolution oil strategy, the domestic forces that helped to shape oil policy, the regional repercussions of the Iranian revolution, and the manner in which the Iranian authorities have reacted to changes in the oil market over the past three and half years are examined.

31826 **Energy-deficit industrializing nations. Part A: the energy problem in the oil-importing developing countries.** Dunkerley, J. (Resources for the Future, Washington, DC). pp 541-564 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

The relationship of economic activity and energy consumption is true in developing as well as industrialized countries, although in different proportions. A review of the energy options of energy-poor developing nations covers traditional and conventional fuels, both of which are in short supply. The technical and economic considerations of the available options emphasize the need for efficient resource allocation and the need to increase domestic production of fossil fuels as well as renewable energy, especially biomass. Pricing policies are the major institutional constraint and the problems of income distribution and equity are the major societal constraint to efficient energy production and use. International financial and technical help in striking a balance between increased production and conservation can take one of several recommended forms. 22 references, 2 tables. (DCK)

2903 Environment, Health, And Safety

REFER ALSO TO CITATION(S) 32404, 32405, 32411, 32412, 32413

31827 **(ANL/EES-TM—105) New Source Performance Standards for industrial boilers. Volume 3. Analysis of energy-technology concerns.** Baker, J.E.; Grogan, P.J.; Streets, D.G. (Argonne National Lab., IL (USA)). Apr 1983. Contract W-31-109-ENG-38. 86p. NTIS, PC A05/MF A01. Order Number DE83011635.

When Congress revised the requirements for new source performance standards (NSPS) under the Clean Air Act Amendments of 1977, it defined a technological system of continuous emission reduction to include not only post-combustion cleanup processes and pretreatent of fuels, but also new energy technologies that are inherently low-polluting. Waivers for certain innovative technologies were also permitted. When the Environmental Protection Agency promulgated NSPS for utility boilers, the concept of commercial demonstration permits was introduced, which resulted in reduced control levels for certain innovative technologies for the first several thousand MW of capacity. This paper addresses whether or not certain advanced energy technologies meet the kinds of NSPS being discussed for conventional steam generators in industry and what alternatives are preferable. Of particular interest are cogeneration, because of its energy-conservation potential, and fluidized-bed combustion, because of its favorable emissions characteristics. Standards related to the combustion of coal-derived fuels, lignite, and anthracite are also examined. Possible regulatory options include temporary waivers or exemptions, relaxed standards, and full standards. Issues relating to NSPS policy formation, such as standards based on emissions per unit of useful energy output, are also discussed.

31828 **Long-term global energy-economic model of carbon dioxide release from fossil-fuel use.** Edmonds, J.; Reilly, J. (Oak Ridge Associated Universities, Washington, DC). *Energy Economics;* 5: No. 2, 74-88(Apr 1983). Contract AC05-76OR00033.

The authors develop a long-term global energy-economic model capable of assessing alternative-energy evolutions over periods of up to 100 years. They have sought to construct the model so that it can perform its assigned task with as simple a modelling system as possible. The model structure is fully documented and a brief summary of results is given. Among of CO_2 results, was the finding that the globe appears to be heading towards a period in which coal and shale oil become economic ways of providing secondary liquids and gases while coal continues to compete with nuclear to supply electricity. Renewable technologies, particularly biomass and non-electric solar and conservation, will provide a very-significant contribution to energy needs by 2050, but continued growth in energy demand spurred by population and economic growth put heavy demands on all fuels. The pattern emerging from the modeling effort, continued slowing of CO_2 growth in this century followed by a jump in the rate of increase, should caution policy makers and researchers from being lulled into believing the CO_2 problem will go away on the basis of present trends and short-term forecasts. 20 references, 6 figures, 1 table.

2904 Natural Resources

REFER ALSO TO CITATION(S) 31245, 31821, 31822, 31835

31829 **(DOE/NBM—3011403) Resources, recycle, and substitution.** Wymer, R.G. (Oak Ridge National Lab., TN (USA)). [nd]. Contract W-7405-ENG-26. 33p. NTIS, PC A03/MF A01. Order Number DE83011403.

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A two-fold strategy appears necessary to ensure that the resource needs of the developed and developing nations are met. First, recycle and substitution must be encouraged in those instances where they do find application. Although these measures have limited applicability, they may be of vital importance in those instances where they do apply; in any event, they buy time. Second, practical and economical technologies must be developed to exploit the lower-grade and marginal ores and the oftentimes abundant but highly refractory ores, as well as to greatly increase the recovery of secondary elements present in the ores - elements whose form and amounts in the ores make them economically unrecoverable by themselves, but which are economically recoverable as by-products. It is often the case that if these elements are not recovered during the initial mining and milling operations, they are rendered unrecoverable, in a practical sense, forever. Furthermore, they may even become environmental pollutants. Specific examples of recovery from refractory ores, by-product recovery, and recycle are given. Also, some suggestions of substitutes for important resources are tabulated.

31830 **(NP—3901277) Development, simulation, construction and testing of a submarine facility for the desalination of seawater by the principle of reverse osmosis.** Peters, T. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Technische Fakultaet). 8 Feb 1980. 176p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83901277.

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Fresh water production by sea water desalination is considered as the only method of compensating a lack of natural freshwater reserves. Sea water desalination processes are described and compared. Process and plant features of the reverse osmosis process are mentioned. This process is characterized by low specific energy consumption. The specific energy consumption could be reduced even further by installing reverse-osmosis plants below sea level.

Results obtained with a pilot plant are presented and discussed. Sea water desalination by reverse osmosis in submarine plants is considered to be an economical and low-cost process.

2905 Research, Development, Demonstration, And Commercialization

REFER ALSO TO CITATION(S) 32915

31831 (CONF-8109203—, pp vp) **National promotion programmes for research and development the energy sector.** Hlawiczka, H. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Small-scale and medium-scale firms of the producing trade can obtain subsidies, i.e. there are grants in addition to the salaries of research and development personnel. Contributions to external r and d tasks are also made. The purpose and the success of this project are illustrated by several examples from the promotion of development projects.

31832 **(DOE/CE—0041) Fourth annual report to Congress and the Secretary of Energy on the nationwide Energy Extension Service Program.** (National Energy Extension Service Advisory Board, Washington, DC (USA)). Mar 1983. 22p. NTIS, PC A02/MF A01. Order Number DE83011072.

This is the fourth annual report of the National Energy Extension Service Advisory Board to Congress and the Secretary of Energy. The report is the Board's appraisal of the Energy Extension Services (EES). In 1983, Congress and the Administration will determine whether EES should continue in 1984.

31833 **(ENEA-RT/EC—82-2) Status of scientific research in Italy: the public sector.** Cesarano, C. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Ciclo del Combustibile). Sep 1982. 42p. (In Italian). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901915.

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About 50% of the overall expenditure for research and development in Italy is financed with government funds. Seventeen ministries are more or less involved with research activities either directly through state owned or controlled organizations or indirectly through allocation of grants or financial support. The purpose of the report is to provide a comprehensive description of the various branches of the research organization in the so-called public sector.

31834 **(IJS-P—294) Annual report of the Jozef Stefan Institute for 1980.** (Institut Jozef Stefan, Ljubljana (Yugoslavia)). May 1981. 264p. (In Slovene). NTIS (US Sales Only), PC A12/MF A01. Order Number DE82903424.

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Information is given on the Institute's organization, staff, and activities during 1980 in the fields of physics, mathematics, ceramics, biochemistry, electron microscopy, chemistry, and nuclear physics.

31835 **Technology development.** Gomory, R.E. (IBM Corp., Yorktown Heights, NY). *Science (Washington, D.C.);* **220**: 576-580(6 May 1983).

Technology development is sensitive to detail and to the culture in which it is embedded. In technology development, significant advances are as often the result of a series of evolutionary steps as they are of breakthroughs. This is illustrated by the examples of the steam engine and the computer. Breakthroughs, such as the transistor, are relatively rare, and are often the result of the introduction of new knowledge coming from a quite different area. Technology development is often difficult to predict because of its complexity; practical considerations may far outweigh apparent scientific advantages, and cultural factors enter in at many levels. In a large technological organization, problems exist in bringing scientific knowledge to bear on development, but much can be done to obviate these difficulties.

31836 **Italy's public/private cooperation in energy technology transfer.** Elias, G. pp 149-156 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Case study.

The 1970s oil shocks left Italy with an 83% dependency on oil imports and a 69% oil share of total energy needs. Italy's response was to diversify energy resources and increase end-use efficiency through massive research investments, incentives, and a National Energy Research Plan (PNRE). The first five years of this approach helped to merge research and technical innovation and to draw researchers back into the production sector. 2 figures, 3 tables. (DCK)

31837 **Divergent expectations and R & D expenditures.** Quirk, J.; Terasawa, K. (California Inst. of Tech., Pasadena). pp 241-258 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The authors outline a very simplified model of the R & D spending process, one appropriate to the case where R & D is a completely appropriabe private good. Within the context of this model, the question raised in whether consensus of beliefs or diversity of beliefs among firm manageers results in larger industry-wide R & D expenditures. Sufficient conditions are given for both results, and special cases are illustrated in which one or the other hold. But, generally, the nature of the issue is such that there does not seem to be a simple intuitive rationale identifying where one or the other case will occur.

2906 Nuclear Energy

REFER ALSO TO CITATION(S) 31245, 31272, 31316, 31674, 31770, 31785, 31786, 31804, 31894

31838 **(CONF-830225—2) Nuclear fuel cycle information workshop.** (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 64p. NTIS, PC A04/MF A01. Order Number DE83009790.

From Nuclear fuel cycle information workshop; Oak Ridge, TN, USA (15 Feb 1983).

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This overview of the nuclear fuel cycle is divided into three parts. First, is a brief discussion of the basic principles of how nuclear reactors work; second, is a look at the major types of nuclear reactors being used and world-wide nuclear capacity; and third, is an overview of the nuclear fuel cycle and the present industrial capability in the US.

31839 **(INIS-mf—7491) Forming of political opinion and decision. The SNR-300 reactor project.** Urban, K. (Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)). Dec 1980. 401p. (In German). NTIS (US Sales Only), PC A18/MF A01. Order Number DE83780433.

Taking the SNR-300 reactor in Kalkar as an example, the process of forming of political opinion and decision is reconstructed in order to get a picture of typical consensus- and conflict patterns in the discussion of safety problems. On this basis, it should be possible to derive a freedom of action for the political and administrative managing of safety matters by means of feed back with social groups. As a crucial point the aspects concerning the steps of the forming of political opinion and decision are examined.

31840 **Three Mile Island: meltdown of democracy.** Walsh, E.J. (Pennsylvania State Univ., University Park). *Bulletin of the Atomic Scientists;* **39**: No. 3, 57-60(Mar 1983).

Strong local opposition to a start-up of Unit 1 at Three Mile Island continues because citizen distrust of General Public Utilities was found in post-accident studies to have been justified. Several citizen groups have monitored the Unit 2 clean-up activities and

have not been reassured by either the President's Commission or the Nuclear Regulatory Commission. Efforts to improve public relations by distributing radiation kits or other strategies have been outweighed by evidence of government manipulation of early bomb test data and poor industry planning. Arguments over who is responsible for the accident and who is liable for the cost have further undermined credibility. Area residents have received three recent legal signals that their position may prevail. (DCK)

31841 **Role of nuclear power.** Eklund, S. (International Atomic Energy Agency, Vienna, Austria). pp 79-107 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

A survey of world nuclear installations, the operating experiences of power reactors, and estimates of future nuclear growth leads to the conclusion that nuclear power's share of world electric power supply will grow slowly, but steadily during this decade. This growth will lead advanced countries to use the commercial breeder by the end of the century. Nuclear power is economically viable for most industrialized and many developing countries if public acceptance problems can be resolved. A restructuring of operational safety and regulations must occur first, as well as a resolution of the safeguards and technology transfer issue. 7 figures, 7 tables. (DCK)

2907 Transport And Storage

REFER ALSO TO CITATION(S) 31157, 31158, 31850

2908 Waste Heat Utilization

REFER ALSO TO CITATION(S) 31974, 31979, 31988, 31989, 31990, 31991

31842 **(DOE/NBB—0031-Vol.1) Cogeneration: regulation, economics and capacity. Volume 1. Regulation.** (Resource Dynamics Corp., McLean, VA (USA)). Apr 1983. 107p. NTIS, PC A06/MF A01. Order Number DE83011124.

Portions are illegible in microfiche products.

Because cogeneration can increase energy utilization efficiency, there is general interest in propagating its use. In 1978 Congress, as part of the National Energy Act, passed the Public Utility Regulatory Policies Act (PURPA). One goal of PURPA is to create an environment that would increase efficiency in energy and facility use by electric utilities through the encouragement of cogeneration and small power production. Congress had found that economic, regulatory, and institutional barriers prevented the implementation of cogeneration technologies and thus lessened the efficiency of energy use in the United States. In order to remedy these problems, PURPA requires that within 1 year of enactment the Federal Energy Regulatory Commission (FERC) implement rules for qualifying cogeneration facilities, and that 1 year later each State regulatory authority implement rules for each electric utility for which it has ratemaking authority. This report examines state approaches to implementing the cogeneration provisions of PURPA under FERC rules. FERC rules were effective as of March 1980. By September of 1982, all but 11 states and the District of Columbia has issued final rules. Arkansas, Colorado, Georgia, Louisiana, Minnesota, Mississippi, Ohio, Pennsylvania, South Dakota, West Virginia, and Wisconsin had not issued final rules.

2910 Conservation

REFER ALSO TO CITATION(S) 31948, 31963, 32001

31843 (CONF-8109203—, pp vp) **National subsidies for energy consultancy services of small-scale and medium-scale firms.** Rammner, P. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

It is the aim to support consultancy services for firms, lectures, seminars and meetings on economic, organizational and technical issues within the context of a more economic and rational utilization of energy by the aid of subsidies from the Federal budget. The regulations have the following objectives both for the individual industries and for national economics: the adaptation of small-scale and medium-scale firms as well as of professionals to the change caused by the technical and economic development on the energy sector is to be facilitated. Moreover, the regulations intend to make a contribution to helping ensure energy supply in the long term. These consultancies which are already subsidized and those which are too costly or which are connected with energy supply contracts resp. with the development of actual planning material are excluded from financial support.

31844 (CONF-8109203—, pp vp) **Enhanced marketing of energy-conserving technologies and products.** Hardwiger, W. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Following the basic idea of energy politics in this programme the technologies and products to be promoted must be especially suitable for energy conservation. 'Energy consumption' in this sense means the utilization of energy carriers for the purpose of energy services. Correspondingly 'energy conservation' shall have to be understood as a diminution of the energy carriers used for certain energy services which are offered on the market. Thus all sectors of energy consumption are included. The programme addresses primarily small-scale and medium-scale firms which are not able to do marketing work either because of their financial possibilities or within the required period of time. The firms must also be able to raise a share of at least 50% in the financing of the marketing costs. It must be proved by documents and declarations of solvency and soundness that the self-financing is secured.

31845 **(IKE-K—58/59) How to substitute heating oils.** Hoecker, K.H. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Nov 1980. 42p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750667.

Portions are illegible in microfiche products.

Considering today's political situation, the one-sided dependence on fuel oil developed over the last 20 years must be counteracted. Two analyses of a general character are submitted. The first contribution deals with the technical possibilities of substitution, showing possible ways of substituting heating oil by other, less insecure energy sources, provided a sensible degree of co-operation can be achieved. The second contribution examines the cost-benefit relation in the realization of the relevant programmes. As capital is limited, this investigation intends to point out how it can be used with maximum benefit. A lecture presented here summarizes the results of a project carried through on behalf of the Ministry of Economy, Trade and Transport for evaluating applications for assistance from public funds for a variety of projects in the field mentioned above.

31846 **(NP—3901183) Energy saving consulting in Hamburg.** (Senat fuer Energieeinsparung, Hamburg (Germany, F.R.)). [nd]. 18p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901183.

For anyone who wants to realise the dream of his own house, the terms of thermal insulation and saving heating plant should be central in planning this. One needs advice from experts for this. A survey of the many consultants offices available in Hamburg is provided. The list was compiled with the assistance of the Hamburg Chamber of Commerce and the Hamburg Trades Council and of professional associations. The information on the special fields of activity of the named consultants is based on their statements.

2920 Supply, Demand, And Forecasting

REFER ALSO TO CITATION(S) 31157, 31158, 31203, 31812, 31821, 31822, 31878, 31879, 31885, 31912, 31913

31847 **(DOE/EI/10639—1/1) Documentation of International Energy Evaluation System. Volume 1. Overview.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10639. 52p. NTIS, PC A04/MF A01. Order Number DE83011097.

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This overview provides a general description of the International Energy Evaluation System (IEES). The discussion emphasizes methodology, capabilities, and uses of IEES rather than implementation details. Discussed are the history and evolution of the current IEES model, and the model's purposes and capabilities. A review of the model's structure is presented, followed by a discussion of major modeling assumptions intrinsic to the system. Applications of IEES and the approach to developing IEES analysis scenarios, limitations of IEES and alternative modeling approaches, and the IEES output reports are described.

31848 **(DOE/EI/10639—1-Vol.2) Documentation of International Energy Evaluation System. Volume 2.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10639. 191p. NTIS, PC A09/MF A01. Order Number DE83011096.

Portions are illegible in microfiche products.

The solution of the IEES system is obtained in three phases. In Phase I, the basic assumptions regarding supply options, future world oil prices, and conservation options are made and converted into associated inputs to the supply and demand sector models. In Phase II, both the supply and demand sector models generate outputs for the linear programming (LP) matrix and the objective function of the LP problems. In Phase III, the IEES model is solved and necessary reports are written. This volume discusses the models, programs, and solution process that constitute Phase III. It describes the formulation of the problem, which is a problem of optimal resource allocation into a linear programming problem, the steps in obtaining an equilibrium solution, the theory behind the solution procedure, and the support programs for preparing output reports.

31849 **(DOE/EI/10639—1-Vol.3-Pt.1) Documentation of International Energy Evaluation System. Volume 3, Part 1.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10639. 200p. NTIS, PC A09/MF A01. Order Number DE83011095.

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This volume contains detailed model descriptions for sector submodels in the integrating model (supply, conversion, refinery, and transportation) and for the demand forecasting models (OECD and Non-OECD). The documentation for each is relatively self-contained, that is, a methodology description, data base description, software description, and user's guide is provided for each.

31850 **(DOE/EI/10639—1-Vol.3-Pt.2) Documentation of International Energy Evaluation System. Volume 3. Part 2.** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). Sep 1981. Contract AC01-80EI10639. 246p. NTIS, PC A11/MF A01. Order Number DE83011094.

Portions are illegible in microfiche products.

Topics covered in this volume include: supply model, transportation model, refineries, and conversion model. The models are described along with the data base, the user's guide, and software.

31851 **(NP—3901180) No future without energy.** Enz, R. (Schweizerische Bankgesellschaft, Zurich). Nov 1980. 64p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901180.

Portions are illegible in microfiche products.

The present brochure tries to give a popular survey of our energy situation which is illustrated by numerous graphs and tables. Particular emphasis is laid on depicting the long-term perspectives of development in energy industry.

31852 **(NP—3901288) Petroleum and energy consumption in the Federal Republic of Germany until the year 2000.** (Deutsche BP Benzin und Petroleum A.G., Hamburg (Germany, F.R.)). Jun 1982. 43p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901288.

The present petroleum prognosis is embedded in an overall forecast of the energy consumption in the Federal Republic of Germany. Its aim is to elucidate the main prognosis results in the light of the development of the economy and the energy requirements. The prognoses comprises the 5-year period ahead of us until 1986, and presents basic values for 1990 and 2000. 1981 serves as the basic year, but the figures from earlier periods are compared as well when necessary.

31853 **(NP—3901797) 1980 energy policy and conservation biennial report.** (Minnesota Energy Agency, St. Paul (USA)). 1980. 345p. NTIS, PC A15/MF A01. Order Number DE83901797.

This biennial report to the governor and legislature presents a twenty year forecast of supply and demand and a discussion of existing and potential state energy actions. Additional information includes a comprehensive analysis of the potentials of renewable energy resources available in Minnesota. (ACR)

31854 **(NZERDC-P—71) Social and economic effects of a disruption to New Zealand's energy supplies: a study of energy vulnerability and dependence.** Jackson, L.R. (New Zealand Energy Research and Development Committee, Auckland). Sep 1982. 123p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901660.

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Possible disruptions in the energy supply system were studied by systems analysis of the petroleum, natural gas, coal, and electric power subsystems. Several independent as well as interrelated supply disruptions are modeled in different end use sectors using dynamic economic interactions. Methods of policy evaluation are presented. (PSB)

31855 **Toward an efficient energy future.** English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). 318p. (CONF-8205148—). Ballinger Publishing Co., 54 Church Street, Cambridge, MA 02138.

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

This is the last in the 3-part International Energy Symposia Series sponsored by the 1982 World's Fair, Knoxville, TN. The first two Symposia's Proceedings were released in October, 1981, and May, 1982, respectively, appearing under the titles (1) World Energy Production and Productivity, and (2) Improving World Energy Production and Productivity - both earlier volumes are also available from Ballinger Publishing Co. Symposium III was designed to conclude the Series' work by moving from technical, economic, social, and environmental considerations to government policy issues; the emphasis was on ministerial/cabinet-level participants who could represent their nations' energy strategies. A separate abstract was prepared for each of 17 of the 21 chapters, eliminating the following: (1) Symposium III Participants' Comments; (2) Draft Communique; (3) Selected Comments; and (4) Closing Remarks by Walter N. Lambert, Executive Vice President, The 1982 World's Fair.

31856 **Summons to energize the global political will.** Marcos, I.R. pp 5-18 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Keynote address.

The Minister notes that the energy crisis involves not only economic and political solutions to energy needs, but a transition in consciousness that challenges our perceptions and assumptions. The new challenge has been to nurture rather than exploit nature and to look on economic development in terms of a balanced ecoculture.

The political will to solve energy problems offers a national and international opportunity to improve the quality of life for all people. Creative applications envisioned include balancing oil trade with water, replacing oil consumption with coal, and solving the problem of nuclear wastes. (DCK)

31857 **Chairman's address.** Hammer, A. pp 19-25 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Symposium III concludes the International Energy Symposia Series associated with the 1982 World's Fair in Knoxville, Tennessee. Opening remarks by Dr. Armand Hammer note the opportunities for appearance, such as the current oil glut, to be deceiving. While cutbacks in oil production by OPEC have affected the US, their impact and that of high energy prices have been devastating to many Third World countries. He suggests a four-point program to make the US less vulnerable while helping the rest of the world: (1) improve relations with Mexico, (2) replace oil with coal wherever possible in both domestic use and exports, (3) proceed with coal liquefaction, and (4) develop shale oil. International cooperation on energy problems can go a long way toward preserving world peace and well-being. (DCK)

31858 **International energy issues and perspectives.** Rose, D.J. (Massachusetts Inst. of Tech., Cambridge); Gibbons, J.H.; Landsberg, H.H. pp 31-61 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Technical paper.

The three co-authors review the findings in Symposium II which identified areas of commonality and tension among nations and suggested possible solutions. They emphasize the need to find new modes of energy use and the importance of international cooperation in understanding and developing the new energy world. The conclusions of the two earlier symposia suggest that energy should be dealt with as a process, not as a crisis, if the transition from a petroleum economy to a better mix of conventional and new energy sources is to be well managed. (DCK)

31859 **Symposium II chairmen/integrators' statements.** pp 63-102 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Seven chairmen/integrators of Symposium II review the major findings of the technical papers in study sections, namely: (1) the role of nuclear power, (2) the biomass energy/nonenergy conflict, (3) energy for rural development, (4) industrialized market-economy nations, (5) industrialized nonmarket economy nations, (6) energy-surplus industrializing nations, and (7) energy-deficit industrializing nations. The authors vary in their presentations, some summarizing the findings and recommendations, other making personal statements. (DCK)

31860 **Energy-information needs for US state-level policy making: minimal data requirements during normal and emergency periods.** Barkenbus, J.N.; Leff, H.S. (Oak Ridge Associated Universities, TN). *Energy Systems and Policy;* 7: No. 1, 65-90(1983). Contract AC05-76OR00033.

Since the oil embargo of 1973, state governments have increased their efforts to track and understand energy flows within their boundaries. There is a commonly perceived need to comprehend the status of present and expected future energy availability, demand, and price and to be prepared to exercise responsible and effective management during energy emergencies. This responsibility has brought with it new needs for accurate and timely state-level information on energy transactions and the external parameters that effect energy availability and disposition. Hence, we ask: what energy data are needed by a state, regardless of its idiosyncracies, during both normal and energy emergency periods, and to what extent are these data available now. We find that needed ongoing (core) data are only partially available at present, and that emergency data can be obtained only with a carefully planned monitoring program that can be fitted to specific emergency conditions. Overall, this paper provides a realistic assessment of the state-level energy data needed to provide state policy makers with sufficient information to make considered judgments. 7 references, 6 tables.

31861 **Computational complexity, length of horizon, and the theory of optimal planning.** Wilde, L.L. (California Inst. of Tech., Pasadena). pp 179-190 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The author focuses on the potential uses of the theory of optimal planning in the development of improved long-term forecasting procedures. Recognizing that important developments in optimal control theory, dynamic programming, and other optimization techniques have occurred over the past two decades, he identifies the major obstacles to their more extensive use in actual forecasting practice: difficulties in determining the appropriate objective function to be used; meeting the substantial computational requirements associated with such models; and collecting the necessary data within the allowable budget. He suggests ways to mitigate the conceptual problems associated with specification of the objective functions and to reduce both the computational time and the data requirements for the application of such techniques to forecasting problems.

31862 **Problems in characterizing expectation formation in energy-economy models.** Cazalet, E.G.; Nesbitt, D.M.; Phillips, R.L.; Stengel, D.N. (Decision Focus Inc., Palo Alto, CA). pp 191-203 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishes (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

This paper addresses the problems of identifying a method by which the expectations of decision makers may be incorporated in long-term energy forecasting models. The authors consider both the theoretical and empirical issues associated with the use of expectations in intertemporal models used in the production, interpretation, and implementation of long-term energy forecasts. The theoretical question may be how to determine a logically consistent model of the expectation-formation process, while the empirical concern is with which model does the best job of predicting. It is pointed out that, at present, most models of expectation formation are essentially ad hoc.

31863 **Technical and social aspects of energy for rural development in Third World countries.** Lumsdaine, E. (Tennessee Univ., Knoxville); Arafa, S. pp 263-308 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

All countries, including developing nations, need access to reliable and affordable energy supplies. The oil-importing developing countries have been especially hard-pressed by rising oil prices, but their policy responses will differ if they perceive the high prices as the result of real shortages instead of political disruptions. This review of available alternative energy options for the Third World considers the relevant socio-economic and technical factors of centralized power systems versus decentralized renewable energy, the institutional constraints, and the informational and educational needs. Each country must select according to its own resource potential and needs, but decentralized energy development generally offers the most economic promise as well as preserving both the environment and the quality of life. The criteria for evaluating and comparing alternative cooking fuels, however, must be geared to each community. International assistance can help to

shorten the estimated 10-year transition period to any new fuel. 32 references, 1 figure, 5 tables. (DCK)

31864 **Energy in rural Winnepeg.** Smil, V. (Manitoba Univ., Winnepeg). pp 309-328 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

China's potential energy resources and production rank near the top, but its low per capita energy consumption and its inefficient use of energy for industrialization have left four-fifths of its population with severe energy shortages and much of its industrialization at a standstill. Programs to develop small-scale energy systems based on local resources have focused on small coal mines, small hydroelectric stations, and family biogas digesters. The implementation of these programs has been disappointing in terms of the energy produced and the additional degradation of the environment. A re-evaluation could include programs for village woodlots, large hydro stations, and more integration into networks. 39 references. (DCK)

31865 **Summary [of Work Session on Energy for Rural Development] with selected comments.** Usmani, I.H. pp 329-336 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Discussions on the large fraction of world population (some two billion people) in rural areas and in isolation from integrated energy systems saw broad agreement on the complexities of the issues and the need to remove constraints and barriers to socio-economic development. Participants examined the energy needs of the domestic and social, the productive, and the transport sectors, and recommended national and international energy package assistance for developing local renewable fuel and power sources. Coal-rich countries could, for example, offer the same type of aid as the US and food-rich countries offer. (DCK)

31866 **Reducing oil dependence in the industrialized market-economy nations.** Lantzke, U.; Gorbet, F.W. pp 339-368 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

The industrialized market economies are moving away from energy systems dominated by oil towards more balanced, resilient, and sustainable systems. Non-fossil-fuel systems are not likely to occur until well into the next century, however, and the immediate challenges are related to reducing dependence on oil, while increasing the productivity and production of energy world wide. The pace and the way in which the transition is managed will have profound implications for economic and social objectives as well as for broader security concerns. The available options are to reduce oil use through efficiency gains and substitution by coal, nuclear power, and natural gas, but neither these nor synthetic or renewable sources will significantly change the energy balances in this century. Short-term contingency plans should protect economic performances from sudden oil price increases, while international cooperation in research and information transfers will help to smooth the transition period. 7 references, 3 tables.

31867 **Energy supply, demand, and policy in the United Kingdom.** Jones, D.leB. pp 369-399 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Energy self-sufficiency sets the United Kingdom (UK) apart from western industrialized ocuntries, but the situation is temporary unless the UK develops new domestic resources by the end of the century. The prudent use of energy sources and preparations for introducing alternatives of oil and gas must be the bases of energy policies, which must also be attuned to world energy supply and demand. Reliance on a market-based energy strategy that recognizes market imperfections and the need for government intervention in issues of national interest is better suited to world uncertainties. 1 figure, 9 tables. (DCK)

31868 **Energy in Hungary: problems and a possible strategy.** Kapolyi, L. pp 409-431 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Forecasts since 1973 indicate a continuous decline in total energy and electricity consumption that are based on the assumption that energy conservation is the most reasonable strategy. Hungary's strategy is to increase geological research and improve the sophistication of energy distribution and utilization systems to keep supply and demand in balance. Emphasis will be placed on coal, oil, natural gas, and uranium production, but the on-site use of alternative sources will also be promoted as subsystems in the complex vertical integration of the total energy system. (DCK)

31869 **Nature of the energy problem in Yugoslavia.** Afgan, N. (Boris Kidric Inst. of Nuclear Sciences, Vinca, Yugoslavia). pp 433-457 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Yugoslavia's current development stage is that of political self-management and a goal of establishing a free market within a socialistic economy. Modest energy and capital resources, uneven consumption patterns, and a lack of manpower reflect a rapid rate of economic development as well as fundamental limits to that development requiring more attention from the international community. Long-term planning for research and development in the energy sector needs help, especially in the area of soft energy options for the next century. 23 references, 6 figures, 3 tables. (DCK)

31870 **Summary [of Work Session on Industrialized Nonmarket-Economy Nations] with selected comments.** Ursu, I. pp 459-475 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

The countries under discussion were found to have a two-fold problem: a short-term problem of securing enough energy to continue supporting their economic systems and a medium- to long-term problem of acquiring the managerial, financial, and technical capacity to pursue an energy transition to alternative and self-sufficient energy systems. Despite recent efforts to rationalize energy demand and make energy use more efficient, the countries need to integrate these efforts with those to diversify energy supplies and reallocate supplies. Each nation must be free to make the technological substitutions compatible with its social and economic structure. The summary ends with a cautionary note that diversity of energy management in a pluralistic world is a goal for global discussion and mutual communication, but the emphasis should be on cooperation rather than the imposition of particular strategies or technologies. (DCK)

31871 **Summary [of Work Session on Energy-Surplus Industrializing Nations] with selected comments.** Sadli, M. pp 525-535 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Industrializing countries with surplus energy resources have opportunities for import substitution in common, but differ in their development needs. The relationship of these countries to OPEC as a whole and their individual development problems should become a major topic of international discussion and cooperation. The participants developed 10 recommendations and options directed toward the needs of developing countries in general, and those with oil-exporting capacity in particular. (DCK)

31872 **Summary [of Work Session on Energy-Deficit Industrializing Nations] with selected comments.** Pauker, G.J. (Rand Corp., Santa Monica, CA). pp 593-603 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

The 100 energy deficit industrializing nations are confronting serious energy problems that require prompt solutions, but the solutions will vary because of the group's heterogeneity. Entrapped by cheap oil, the countries are vulnerable to serious shortages of food and energy. The work session identified common energy problems and measures that could be helpful. They emphasized the need for help in developing energy strategies and plans, the fuelwood crisis, and the need for fuel substitution. An added note suggests a possible role for coal-rich countries to offer energy assistance. (DCK)

2930 Policy, Legislation, And Regulation

REFER ALSO TO CITATION(S) 31170, 31800, 31805, 31809, 31819, 31832, 31841, 31842, 31855, 31857, 31858, 31859, 31867, 31868, 31869, 31870, 31872, 31901

31873 **(NP—3901758) 1983 energy policy & conservation report.** (Minnesota Dept. of Energy, Planning and Development, St. Paul (USA)). 15 Dec 1982. 51p. NTIS, PC A04/MF A01. Order Number DE83901758.

Public policy issues are addressed by describing the state's energy problems; identifying the range of technical solutions; evaluating the economic viability of those actions for Minnesota; delineating the government role; planning legislative approach; and encouraging public participation in the energy policy process. (PSB)

31874 **International energy cooperation from a European Community perspective.** Carpentier, M. pp 157-166 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

The European Community (EC) views international energy cooperation as an integral part of world economic development. The EC chooses to take a long view in regard to world oil demand in its efforts to shift away from oil dependence and to increase its imports of other fuels. EC energy ministers meet two or three times each year to review the energy situation and their objectives, which are to diversify energy supplies, stimulate energy investment, coordinate energy research and development, stabilize energy markets, and develop a common approach to energy relations with other countries. International cooperation has the greatest potential in coal and nuclear materials, but cooperation must be backed up with a recognition among oil producers and consumers that their interests are mutual and a commitment to assist the oil-importing developing countries. (DCK)

31875 **Energy policy in the 1980s: the risks of success.** Lantzke, U. (International Energy Agency, Paris, France). pp 171-178 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

It seems clear that when energy, in industrialized and in developing countries, has become a major element of structural change, discussions among producers and consumers may be helpful to exchange views. Where mutually beneficial, it may be helpful to develop policies which are based on better knowledge of what is happening in the world and where it could be leading us. The market conditions of today reinforce the need for stable energy relations among producers and consumers. There are many opportunities for working together, informally and without headlines, on issues of mutual, practical interest.

31876 **Italy's energy strategy.** Briganti, G. pp 179-182 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Italy's National Energy Plan has a goal of reducing oil's share of energy consumption from 67.2 to 51% by 1990. Italy is developing international agreements with several coal-producing countries and developing the infrastructure to handle large imports of coal. A natural gas pipeline from Algeria and cooperation with France and Germany on fast breeder reactors are the other major strategy components. (DCK)

31877 **France's energy policy.** Rimareix, G. pp 183-197 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

France is focusing on nuclear energy in its effort to reduce its dependence on imported oil, to reduce the relationship between energy consumption and economic growth, and to develop and implement new and renewable resources. Political changes since Mitterand's election have taken a more democratic approach to increase public support of energy policies. This included more public information and consultation and decentralization of programs. (DCK)

31878 **Energy policy in the Federal Republic of Germany.** Engelmann, U. pp 199-203 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

The Federal Republic of Germany, which imports 60% of its primary energy, is emphasizing conservation, fuel substitution, diversified energy supplies, emergency strategies, and international cooperation. All policies are keyed to a belief in the market-economy system based on free pricing and competition among industries. German industries and consumers have made this approach work with the support of a government-sponsored information campaign and some financial incentives. (DCK)

31879 **United Kingdom's energy policy.** Jones, D.B. pp 205-208 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

The energy-rich United Kingdom (UK) recognizes that it must participate in international discussions because its hydrocarbon resources are finite and its economy is affected by the worldwide recession and unemployment caused by the increase in world oil prices. Most energy production in the UK is nationalized, but energy policy generally follows a market-oriented approach with energy pricing and the removal of competitive barriers key factors.

Energy-policy goals are full development of hydrocarbon resources, full development of coal and nuclear power, conservation, and some research on renewable energy resources. (DCK)

31880 **Japan's energy strategy.** Ikuta, T. (Inst. of Energy Economics, Tokyo, Japan). pp 209-213 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Energy policy is aimed at reducing the vulnerability that a large population and an 86% dependence on imported energy Japan accepted as a tradeoff for economic growth. Top priority is given to establishing secure energy supplies to maintain that growth, which means reducing dependence on Middle East oil by diversifying supply sources and promoting conservation. Laws to promote fuel substitution have reduced oil's share of energy consumed below the 70% level. Government subsidies encourage research and development of alternative energy sources. Japan's policies are set in an international framework because of its trade dependence. (DCK)

31881 **Energy policy in Australia.** Ives, D.J. pp 215-232 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Australia's energy policy is tuned to world energy supplies in order to benefit from the opportunities to use and export alternative fuels as well as oil. A two-tier government structure separates national taxing and economic control from state control over energy resources. Goals of self-sufficiency in liquid fuels, development of indigenous resources, energy diversification, and exports to less-endowed nations are the primary policy objectives to be accomplished by market mechanisms and private enterprise, with government intervention only where appropriate to provide incentives. Domestic oil is priced at world market level, for example. Australia attempts to avoid short-term overreaction by establishing long-term goals and strategies consistent with its resources and its interaction in world markets. 7 references, 3 tables. (DCK)

31882 **Republic of Korea's present energy picture and major policy implementation plan.** Hahm, H.J. pp 233-240 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Korea's lack of indigenous energy resources combined with a rapid economic development has led to problems in import dependence (especially in oil), a high financial burden, and a heavy concentration of Middle East suppliers. Environmental and energy-intensity problems are also increasing in importance. Policies to meet these problems include secure and diversified energy supplies, developing petroleum resources - domestic and as joint ventures abroad, and encouraging conservation and fuel substitution. (DCK)

31883 **Republic of the Philippines' renewable energy strategy.** Dumol, P. pp 241-245 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Philippine policies of shifting away from oil emphasize the development of geothermal energy and the construction of coal, hydro, and nuclear power plants. Estimates of electric power demand indicate that indigenous resources will be adequate. Gasifiers to produce transportation fuels and wood fuels for industrial plants and power generation are key factors in the renewable energy program. (DCK)

31884 **Outlook for a sustainable energy future.** pp 283-289 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Final communique.

The central message of the three International Symposia emphasizes the importance of each country adopting an energy policy suitable for its needs, but encourages an appropriate mix of energy sources to promote a stable energy supply and economy. International cooperation and assistance is essential, but particularly for the energy-deficit developing countries. The participants identified energy options, both short- and long-term for industrialized and less-developed nations. (DCK)

31885 **Closing address.** Edwards, J.B. pp 295-299 of Toward an efficient energy future. English, M.R.; Bohm, R.A.; Clinard, L.A. (eds.). Cambridge, MA; Ballinger Publishing Company (1983). (CONF-8205148—).

From 3. international energy symposium - toward an efficient energy future; Knoxville, TN, USA (27 May 1982).

Energy Secretary James B. Edwards outlines an optimistic challenge to symposium participants by noting the progress made toward relieving world dependence on oil and the new confidence that technology, international cooperation, and new energy sources are providing. He credits the Reagan administration with recent positive directions in the US. He notes six lessons learned since the 1973 to 1974 oil shock: (1) that reliance on a single energy source is counter-productive; (2) that centralized energy policies don't work; (3) that only cheap energy is running out; (4) that there is more elasticity between gross national product and energy consumption than we supposed; (5) that resource-poor countries with the fastest-growing oil demand suffered the most; and (6) that self-sufficiency goals are common to all nations, but achievable by only a few. (DCK)

31886 **Opening charge.** Rose, D.J. (Massachusetts Inst. of Tech., Cambridge). pp 9-16 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Symposium II's mission was to analyze the issues raised in Symposium I and to recommend policies out of the paradoxes and conflicting goals of those issues. In his charge to the participants, David Rose touches on the shortening of the time perspective between the two symposia, the definition of responsibilities, rational use of energy and appropriate uses of electric power, capital formation and the full participation of developing countries, the range of information from beneficial education and training to uncertainty, and overload and the value of a participatory and sustainable society. (DCK)

31887 **Alternative energy futures. Part B: appropriate energy strategies for industrializing countries.** Iglesias, E.V. pp 42-61 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

The energy question involves the technical challenge of creating adequate future energy supplies, the scientific challenge of finding new energy sources to replace hydrocarbon, and the economic challenge of planning economic and social development in a future of rising energy costs. The transition to balanced mix of renewable resources is inevitable and viable, although society must make some structural accommodations. Developing countries will have to base their efforts on conservation and efficiency and on increases in the production and use of both conventional and renewable resources, in which energy and energy sources are an integral part of the specific economic development needs of each country.

Five fundamentals of an energy strategy for developing countries consider the explosion of energy demand, economic and social structure, known energy resources, lifestyles and values, and the dynamics of emerging energy technologies. The concrete objectives of an appropriate energy strategy include the broad areas of supply, planning demand, and policy instruments which strike the best relative roles for government and the marketplace. Despite obstacles to energy alternatives, they are balanced by opportunities to review and revise energy strategies as well as opportunities for international cooperation. (DCK)

31888 **International cooperation and the development of institutional arrangements on energy.** Campbell, D.W.; Holbrook, J.A.D. pp 63-76 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

A review of discussions, negotiations, and proposals for international cooperation in energy illustrates how political and economic considerations must influence and direct the search for international institutional arrangements in the same way that the crisis itself is essentially political and economic. These institutions address, particularly in the North/South context, a much broader range of issues and problems than simply energy. At the operational level the very comprehensiveness of global plans and strategies may make them inefficient or even impossible to implement. History suggests that the world needs more than an appropriate climate for development to flow from free market forces and private investments. We must stress the interdependence of our economic futures and the national benefits that flow from international cooperation, but we must also be realistic about what is attainable. 11 references.

31889 **Choice of energy policies for a rapidly industrializing country: a case study of the Republic of Korea.** Moon, H. pp 573-591 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

South Korea's rapid economic growth, the result of an expanding manufacturing sector and gross national product, was due in part to the high income elasticity of energy demand. Korea differs from other high-elasticity countries, however, due to a minor energy conservation effort and a movement towards energy-intensive industry in comparison to its small energy resource base. Alternatives to imported energy sources are the development of domestic coal and generating capacity, securing foreign supplies, and stockpiling. Korea could reduce total energy costs by lowering demand or lowering unit costs of energy supplied. Pricing policies which emphasize industrial development are not favorable to long-term price and resource allocations. A set of criteria for evaluating energy policy options finds Korea's policies fair, but suggests improvements in conservation efforts in the context of pricing policies and energy cost increases and a better mechanism for disseminating energy information. 8 references, 5 tables. (DCK)

31890 **Closing summary.** Rose, D.J. (Massachusetts Inst. of Tech., Cambridge). pp 609-626 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Common themes during the conference were the identification, analysis, and resolution of energy problems, the importance of international cooperation, and the need for global security and peace. David Rose reviews the conclusions and recommendations in the context of time perspectives, rational and effective energy use, and rural development and biomass in oil-importing developing countries. Other conclusions and recommendations addressed electric and nuclear power, economic and pricing policies, oil-exporting developing countries, and the need for better transmission of information. (DCK)

2940 Fossil Fuels

REFER ALSO TO CITATION(S) 31042, 31074, 31074, 31099, 31121, 31155, 31157, 31158, 31160, 31161, 31162, 31163, 31164, 31165, 31166, 31170, 31171, 31180, 31202, 31202, 31203, 31204, 31206, 31823, 31824, 31825, 31850, 31852, 31911, 31911, 31911

31891 **(ANL/EES-TM—216) Regulatory impact of the Resource Conservation and Recovery Act on energy facilities.** Fradkin, L.; Barisas, S.; Streets, D. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 111p. NTIS, PC A06/MF A01. Order Number DE83011636.

This study evaluates the impact of the Resource Conservation and Recovery Act (RCRA) on conventional (utility and industrial coal-fired) and potential new (coal gasification, coal liquefaction, and oil shale) energy facilities. Information presented herein should be useful for policy decisions regarding solid and hazardous wastes from energy production.

31892 **(DOE/EI/11857—1) Documentation of data inputs to the National Coal Model.** (Kilkeary, Scott and Associates, Inc., Arlington, VA (USA)). Apr 1983. Contract AC01-82EI11857. 354p. NTIS, PC A16/MF A01. Order Number DE83011732.

This publication presents documentation of the principal data inputs to the National Coal Model (NCM) and of selected inputs to the Resource Allocation and Mine Costing (RAMC) model. It is intended for the analyst familiar with economic-engineering modeling of the coal and electric utility industries, and with the NCM and the RAMC model in particular. Chapter 1 of this document provides an introduction to the NCM and a brief description of its major components. Chapter 2 presents documentation of the data from which the NCM linear programming matrix is generated. The documentation presents a description of each data element and identifies the units in which the data element is measured, provides a brief citation of the source of the data in use as of February 1983, and describes the derivation of the data. Formal citations of the sources of the data used in the NCM are provided in the bibliography presented in Chapter 3. Chapter 4 provides an index to the principal data inputs. A description of the NCM Transportation Rate Generator is presented in Appendix A. Documentation of the non-resource related data inputs to the RAMC model are presented in Appendix B. Data inputs to the NCM as of February 1983 are presented in Appendix C. Internal memoranda prepared by the electric Power Division and Synergic Resources Corporation that are cited as sources in Chapter 2 and Appendix B are presented in Appendix D. The distribution of metallurgical and steam coal exports to NCM demand regions is described in Appendix E.

31893 **(DOE/EIA—0382) Natural gas: use and expenditures.** Peabody, G.E. (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Apr 1983. 135p. NTIS, PC A07/MF A01. Order Number DE83012079.

This report addresses the following questions concerning natural gas: who uses it; what do they use it for; how much do they use; what do they pay for it. First, an overview of natural gas use from 1970 through 1980 is presented that discusses consumption and expenditures for natural gas by sector and by region of the country. This discussion of trends is followed by a detailed look at the end-use sectors that use natural gas most intensively - residential, commercial, and manufacturing industries. Findings from surveys of individual consumers of gas - households, commercial buildings, and manufacturing establishments - are presented. These survey data provide detailed information about natural gas use within each sector.

31894 **(DOE/EIA—0384(82)) 1982 Annual Energy Review.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Apr 1983. 240p. NTIS, PC A11/MF A01. Order Number DE83012002.

Total energy consumption in the United States equaled 70.9 quadrillion British thermal units (Btu) in 1982, a decline of 4.1% compared to 1981. Depressed economic activity was a major factor in reducing total energy demand. However, conservation also played a role as energy consumption per dollar of GNP continued to fall. Most of the decline in energy use involved petroleum and natural gas. Reduced petroleum demand translated into a 21.7% reduction in net petroleum imports. Natural gas demand and production fell, prompted by reduced economic activity and a substantial increase in prices. Crude oil prices fell for the first time in more than a decade. Weakened market conditions adversely affected the rate of domestic oil and gas exploration and development activities. Nonetheless, domestic crude oil production rose 1.2%. International activities were highlighted by a decline in crude oil production, especially by members of the Organization of Petroleum Exporting Countries (OPEC), a decrease in crude oil prices, and a substantial increase in electricity production by nuclear-powered utility plants in non-Communist countries. Energy production in the United States in 1982 remained essentially unchanged from that of 1981, as small gains in hydroelectric power and nuclear power production were offset by losses in natural gas production. For the third straight year, energy consumption in the United States declined. Whereas declines in 1980 and 1981 resulted primarily from consumer response to higher prices and conservation, the 1982 decline reflected primarily an economic slowdown, especially in industry. Annual per capita consumption fell to 306 million Btu, the lowest level since 1967. Changes in energy prices in 1982 were mixed. Whereas most petroleum prices declined, prices of natural gas, coal, and electricity rose.

31895 **(DOE/EIA—0394(EX)) Model documentation of the Short-Term Coal Analysis System.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Apr 1983. 18p. NTIS, PC A02/MF A01. Order Number DE83011472.

The short-term coal analysis system (SCOAL) is used by the Data Analysis and Forecasting Branch (DAFB) as an analytic aid to support preparation of short-term projections of bituminous coal and lignite production at the state level, and anthracite production, domestic imports of coal, and domestic and export demand for US coal at the national level. A description of SCOAL is presented which includes a general overview of the model and its analytical capabilities. (DMC)

31896 **(NP—3901186) Trinidad and Tobago - energy survey 1980/81.** (Bundesstelle fuer Aussenhandelsinformation, Koeln (Germany, F.R.)). Aug 1982. 19p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901186.

Portions are illegible in microfiche products.

By the help of numerous data a short survey of the energy situation of Trinidad and Tobago is given. After having made some remarks on the energy policy the authors describe the development of the individual energy carriers and of power generation. Furthermore, some important data on the foreign trade are presented.

31897 **(PB—83-147363) Increased automobile fuel efficiency and synthetic fuels: alternatives for reducing oil imports. background paper number 2: selected technical and economic comparisons of synfuel options.** (Office of Technology Assessment (U.S. Congress), Washington, DC). Oct 1982. 257p. NTIS, PC A12/MF A01.

This study is a comparative technical and economic assessment of selected synfuel technologies. It is a component part of a much larger study being conducted by the OTA on energy options. A key purpose of this study is to provide technical and economic comparisons among selected synfuel technologies which, to the extent possible, provides a background and basis which may assist the OTA in its policy deliberations.

31898 **(PB—83-150748) Natural resource protection and petroleum development in Alaska.** Hanley, P.T.; Hemming, J.E.; Morsell, J.W.; Morehouse, T.A.; Leask, L.E. (Dames and Moore, Anchorage, AK (USA)). Aug 1981. 327p. NTIS, PC A15/MF A01.

This report reviews administrative roles, authorities, procedures, and decision-making processes for oil and gas leasing and post-lease environmental management for both the State and Federal governments. Past and present oil exploration and development efforts in Alaska, and a general assessment of the most promising areas for future exploration are reviewed. Two case studies of petroleum development and environmental management in Alaska are given: the Kenai National Moose Range in southcentral Alaska and the National Petroleum Reserve in northern Alaska.

31899 **Beyond combustion.** Sheppard, W.J. (Battelle Memorial Inst., Columbus, OH). pp vp of Kentucky industrial coal conference. Lexington, KY; University of Kentucky (1982). (CONF-8204104—).

From 21. annual Kentucky industrial coal conference; Lexington, KY, USA (21 Apr 1982).

Feedstock for chemicals is not likely to become a market for coal as is continued fuel use, throughout the economy. Fuels can be prepared by hydrogenation, pyrolysis, and reforming. A number of coal gasification or liquefaction processes have been proposed, but all have stopped short of commercialization. An exception is the making of coke from char for smelting iron. These processes are reviewed, briefly. Projections indicate that the amount of coal set aside for synfuel production in the next 10 to 15 y will be moderate and is unlikely to perturb the coal market. 4 tables. (FR)

31900 **Energy and economic development in Arab OPEC countries.** Askari, H. pp 501-523 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing, Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

OPEC countries have only their status as net oil exporters in common. The task of analyzing the energy and development prospects of the diverse group is simplified by focusing on seven Arab countries: Algeria, Iraq, Libya, Kuwait, Saudi Arabia, Qatar, and the United Arab Emirates. The analysis considers the economic characteristics, energy resources and balance of energy supply and demand, economic achievements, and economic prospects of each. An analysis of the countries in light of past historical parallels and future possibilities and constraints concludes that all must transform their oil assets into productive nonoil domestic and foreign assets if they want to succeed over the long run. 4 references, 6 tables.

31901 **Saudi Arabia's oil policy.** Quandt, W.B. Washington, DC; Brookings Institution (1982). 51p. (DOE/PE/70267—T3). Brookings Inst., 1775 Mass. Ave., N.W., Washington, DC 20036. Contract AC01-80PE70267.

This study analyzes: how Saudi Arabia has used its oil power in the recent past; the mixture of motives that seem to go into Saudi oil policy; the prospects for Saudi Arabia remaining dominant force in the world oil market in light of changing supply and demand conditions; and internal instability that could change the willingness or ability of Saudi leaders to act as price leaders. Also discussed is how the US can develop policies to ensure the stability of the Middle East region. (DMC)

2950 Hydrogen And Synthetic Fuels

31902 **Understanding cost growth and performance shortfalls in pioneer process plants.** Merrow, E.W.; Phillips, K.E.; Myers, C.W. Santa Monica, CA; Rand Corp. (1981). 113p. (RAND/R—2569-DOE). Contract AC01-79PE70078.

Misestimation of the capital costs and performance of innovative energy process plants and other chemical process facilities creates fundamental problems for government and industry in planning the development and commercialization of such plants. What factors are responsible for inaccurate cost estimates for process plants? How well do pioneer plants perform and what factors are responsible for poor plant performance? What are the implications of the answers to the above questions for planning by the process industries and DOE? Thirty-four firms in the process industries provided data. Detailed proprietary information on 44 process plants sustained the analysis. Most of the variation found in cost-estimation error can be explained by the extent to which the plant's tech-

nology departs from that of prior plants, the degree of definition of the project's site and related characteristics, and the complexity of the plant. Most of the variation in plant performance is explained by the measures of new technology and whether or not a plant processes solid materials. The routinely high performance assumed for pioneer process plants is unrealistic. Over 50% of the plants in the sample failed to achieve their production goals in the second six months after startup.

2960 Electric Power

REFER ALSO TO CITATION(S) 31165, 31820, 31850, 31894, 31911

31903 (CONF-8109203—, pp vp) **Reducing peak performance rates in electric power supply.** Dohrmann, H.J. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The organization of tariffs and contracts is presented in detail, particularly those for special consumers of electric power. Furthermore, the author deals with the following measures which can contribute to lowering the energy costs: maximum control, reducing internal power generation as well as circuit and machine losses.

31904 (DOE/ET/29116—T1) **Statistical approach to physically based load modeling. Final report.** Chong, C.Y.; Malhami, R.P. (Georgia Inst. of Tech., Atlanta (USA). School of Electrical Engineering). Apr 1983. Contract AS01-77ET29116. 107p. NTIS, PC A06/MF A01. Order Number DE83011071.

A methodology for synthesizing the electric load for a system starting from the elementary device models is proposed. Since the methodology is physically based and captures the stochastic nature of the decision processes which generate the load, it is more suitable than identification-based approaches in applications such as load management. It generates a hierarchy of models from the customer or building level to the bulk power level. At each level, the methodology consists of four steps, the representation of primitive components, the classification of components, aggregation, and model validation. This research focuses on modeling the load demand of a large number of similar devices at the lowest level. Each elementary device in the system is represented by two models: the functional model which gives the on or off status of the device and the electric-device model which summarizes the effects of voltage and frequency. Only loads with similar functional and electric characteristics can be replaced by an equivalent model. For such a homogeneous group, statistical aggregation yields a model consisting of coupled ordinary and partial differential equations. The methodology is used to model the space heating of a large number of houses. Simulation of cold-load pickup is used to illustrate the main features of the final model. Data requirements for such models are discussed and found to be modest.

31905 (EPRI-EA—2926) **Framework for assessing EPRI roles in commercial demonstration projects. Final report.** Boyd, D.W.; Borison, A.B.; Morris, P.A. (Decision Focus, Inc., Los Altos, CA (USA); Applied Decision Analysis, Inc., Menlo Park, CA (USA)). Mar 1983. 70p. NTIS, PC A04/MF A01. Order Number DE83901928.

A conceptual framework and a quantitative methodology for identifying the potential benefits of commercial demonstration projects and for assessing the value of alternative EPRI roles in these projects is described. The methodology, based on the precepts of decision analysis, provides a logical way to integrate the many complex issues that arise when evaluating the impacts of demonstration projects on the commercialization process. The methodology includes a specific process for evaluating alternative demonstration strategies in the context of different market environments. In addition, it carefully defines several different dimensions of demonstration-project success. These dimensions are useful for understanding different aspects of the demonstration and commercialization processes.

31906 (EPRI-EL—1960-Vol.5) **Human-factors review of electric-power-dispatch control centers. Volume 5. Information management and presentation summary. Final report.** Miller, R.J.; Najaf-Zadeh, K.; Darlington, H.T.; McNair, H.D. (Stagg Systems, Inc., Tustin, CA (USA)). Mar 1983. 76p. NTIS, PC A05/MF A01. Order Number DE83901938.

The application of human factors disciplines to electric utility control center operations can minimize human engineering deficiencies. After detailed examination of the information the operator requires, certain criteria emerge: more data must be converted into meaningful information, information must be easily comprehended by operators, and operating states or conditions and time domains should be considered. Previous study phases of RP1354 carefully analyzed the above. This phase, Phase III, now covers, in more detail, the operators' information needs and how information should be efficiently managed and effectively presented. Information management includes assembling the raw data, processing it, and presenting and/or storing it. In analyzing information management requirements, operators were examined as a system component. From a human factors perspective, perception, performance, and memory were evaluated. Techniques and methods applied to monitoring, such as combinatorial and alarm processing, and software assignment of console functions were examined. Information management objectives are directed at the reduction of operator information to clarify his options, yet providing for the extraction of supplemental information upon demand. Information presentation is examined considering human factors guidelines for CRT information presentation including information access, display parameters, display formatting, single-line displays, group displays, tabular displays, bar graph displays, trend displays, windowing, CRT image transformations and audible alarms. Presently available technology and hardware devices such as mapboards, CRT monitors, display generators, keyboards, cursor control devices, hardcopy printers, and telephone systems were analyzed to identify their benefits and restrictions. Desirable features for the design of a new or the modification of an existing control center are presented.

31907 **Simulating the spiral of impossibility in the electric-utility industry.** Ford, A.; Youngblood, A. (Los Alamos National Lab., NM). *Energy Policy;* **11**: No. 1, 19-38(Mar 1983).

This article examines the spiral of impossibility for different types of investor-owned electric utility companies in the USA. The spiral begins with an increase in electricity price that discourages demand growth. The utility must spread its fixed costs over fewer kilowatt-hours of sales, which, in turn, leads to still higher rates. Computer-simulation techniques are used to quantify whether the spiral would pose serious planning problems for utility companies, and the effect of policies that might mitigate the spiral's effects are tested. The conclusion is that the spiral poses substantial planning problems for utility companies building long-lead time power plants, serving customers with high price elasticity of demand and quick response time, but those relying on oil or natural gas are less vulnerable. 16 figures.

31908 **Meeting energy needs: additions to capacity.** Burness, H.S. (Univ. of New Mexico, Albuquerque). pp 227-240 of Coal models and their use in government planning. Quirk, J.; Terasawa, K.; Whipple, D. (eds.). New York, NY; Praeger Publishers (1982). (CONF-7907126—).

From DOE/JPL conference on coal models and their use in government planning; Carmel, CA, USA (1 Jul 1979).

The relationship between the policy choice of a Loss-of-Load-Probability (LOLP), the response of decision makers in a utility attempting to minimize generating costs, and the choice of generating-capacity investment levels are studied. This has relevance for long-term energy forecasting in that changes in LOLP levels are one policy measure that can be implemented with relative ease and yet can have profound effects on the level of generating capacity through their effect on the choice of the mix of plants of various size (and hence fuel efficiency). While no attempt is made here to characterize the optimal choice of a LOLP, the author points out that the potential impact of changes in LOLP is significant, given that the standard LOLP has been constant for a numer of years. 1 figure, 4 tables.

31909 **Alternative energy futures. Part A: the case for electricity.** Colombo, U. pp 20-41 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Technology may be able to bridge the gap between the high and low energy futures of the forecasters, but socio-economic systems are not as easily manipulated. Both extremes refer to the services which energy renders, with the soft path pursuing energy efficiency and the hard path emphasizing functionality, and both seeing the need for the increasingly high quality of energy that electricity provides. The case for electricity in both developed and developing countries includes the importance of both local and centralized production. The conversion of coal and nuclear power into electricity has raised many obstacles at a time when immediate action is in order. Government and politicians should remember the fundamental issues of (1) rational energy use and conservation and (2) electricity supplies. 9 references, 11 figures. (DCK)

31910 **Demand charges and electricity tariffs.** Kleindorfer, P.; Finsinger, J. Berlin, Germany; Wissenschaftszentrum (Nov 1981). 22p. (IIM/IP—81-24). Wissenschaftszentrum, Internationales Inst. fuer Management und Verwaltung, Berlin, Germany, F.R.

This paper investigates the optimality of Hopkinson Tariffs and demand charges. When demand is flat in a given set of pricing periods and relatively stable over time, then peakload pricing following standard marginal cost pricing methods is the preferred tariff structure. However, when the structure of demand is unstable or peak period interconsumer diversity is low, then demand charges may be appropriate. Information limitations on the part of rate designers, and uncertainties on the structures of demand can prevent an acurate assessment of optimal peak-load prices. The use of demand charges gives consumers more stable signals on capacity costs and allows them to adjust their own peak demand while paying a fair share of system capacity costs.

2980 Consumption And Utilization

REFER ALSO TO CITATION(S) 31893, 31931, 31947, 31951

31911 **(DOE/EIA—0035/83/04) Monthly energy review.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Apr 1983. 111p. NTIS, PC A06/MF A01. Order Number DE83011349.

Current data for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States are presented. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities. Energy production for January 1983 totaled 5.2 quadrillion Btu, a 5.4% decrease from the January 1982 level of production. Decreases in production occurred for natural gas and coal. Natural gas production was down 11.6% and coal production was down 8.8%. Petroleum production increased 0.5%. All other forms of energy production combined were up 3.7%. Energy consumption in January 1983 totaled 6.5 quadrillion Btu, a 9.4% decrease compared to the level of consumption for January 1982. Decreases occurred in the consumption rates of natural gas (16.9%), petroleum (7.1%), and coal (6.4%), accounting for the overall decline in energy consumption during January. The consumption rate of all other forms of energy increased 3.3%. Net imports of energy for January 1983 totaled 0.6 quadrillion Btu, 15.9% below the level of 1 year earlier. Net imports of petroleum decreased 2.0%, and net imports of electricity and coal coke combined decreased 3.6%. Natural gas net imports increased 17.3%. Net exports of coal were down 28.0%.

31912 **(NP—3901987) Connecticut energy situation.** (Connecticut Office of Policy and Management, Hartford (USA)). 1982. 17p. NTIS, PC A02/MF A01. Order Number DE83901987.

An overview of Connecticut statistics are presented for petroleum supply and price outlook in relation to other fuel supplies. (PSB)

31913 **(NP—3901990) Connecticut energy data.** (Connecticut Office of Policy and Management, Hartford (USA)). Jan 1983. 41p. NTIS, PC A03/MF A01. Order Number DE83901990.

An overview of Connecticut statistics in supply and demand is presented for petroleum supply and price outlook in relation to both fossil fuels and renewable resources. (PSB)

2990 Unconventional Sources And Power Generation

REFER ALSO TO CITATION(S) 31369, 31374, 31379, 31488, 31491, 31515, 31572, 31820

31914 **(DOE/SF/11648—T1) Review of 1982 DOE solar budget and future plans for building heating and cooling.** (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Atlanta, GA). 1982. Contract AC03-82SF11648. 11p. NTIS, PC A02/MF A01. Order Number DE83011103.

Comments are made on 44 projects in the active and passive solar programs of DOE. The areas of past contributions by DOE to the solar segment of the HVAC industry are briefly summarized, and it is recommended that DOE's future goal should be to assist industry to build a broader technological base for development of improved components and systems for utilization of solar input. It is also recommended that this goal be accomplished by support of high risk, long range research with high potential benefits not already being attempted by industry, and also by support of lower risk research which has a broad promise of industry-wide payback when industry itself is not in a position to support such research. (LS)

31915 **Role of renewable resources in Hawaii's energy future.** Shupe, J.W. (Hawaii Univ., Manoa). pp 211-247 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Hawaii's energy-use patterns paralleled global fuel trends until the 1973 oil embargo, when Hawaii began substituting renewable energy sources for oil. As the nation's most vulnerable state in terms of fossil fuels and its isolation from transportation systems and electric grids, Hawaii has made impressive progress in research and planning for oil substitutes. The renewable options available to the islands include solar insolation, trade winds, climate and rainfall suitable for biomass, ocean thermal gradients, and high-temperature geothermal resources. The status of projects in each of these options reflects strong public support. A summary of the major environmental, societal, and social constraints for each source underscores the need for at least 20 more years to make a gradual transition to energy self-sufficiency because of the many factors which are independent of state planning. 29 references, 7 figures, 3 tables. (DCK)

31916 **Summary [of Work Session on Biomass Energy/Nonenergy Conflict] with selected comments.** Abelson, P.H. pp 249-260 of Improving world energy production and productivity. Clinard, L.A.; English, M.R.; Bohm, R.A. (eds.). Cambridge, MA; Ballinger Publishing Co. (1982). (CONF-8111133—).

From 2. international energy symposium on improving world energy production and productivity; Knoxville, TN, USA (3 Nov 1981).

Countries will vary in the speed with which they move toward biomass energy according to their domestic resources, the efficiency improvements in their energy use, and the differences in their climates and available land. The workshop conclusions that high priority should go to international bioenergy programs identify a need for research and development in the energy efficiency of

biomass utilization, optimum use of non-farm land, and effective uses for woody materials. The participants also recommend biomass resource inventories by country, an international bioenergy institute, and financial support for demonstration facilities. (DCK)

30 DIRECT ENERGY CONVERSION

3001 Mhd Generators

REFER ALSO TO CITATION(S) 31591

31917 (ANL—82-62, pp 372-380) **Computer-aided fluctuation analysis of an MHD generator.** Barbay, J.E. Jr.; Sami, S. (Southern Illinois Univ, Carbondale). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

Three channels of data recorded during tests conducted jointly in the USSR by ANL and their Soviet counterparts on an MHD channel were analyzed with the aid of a micro-computer. The recorded signals were from the main inverter and two voltages from different segments of the channel. A Z80/S100 based computer with an 8 bit A-to-D conbertor, a two port RS232 card with a 64 microsecond clock and a Hi-Point plotter were used to (1) plot the data and (2) make some basic measurements (e.g., RMS, mean). Using the definition of the correlation coefficient a FORTRAN program was written and used to evaluate the coefficient. This required the writing of an assembly language subprogram to read data from the disk to an integer FORTRAN array. Using results from the multiple runs with the correlation coefficient, plots were made in an effort to gain some information about the transient time of the plasma in the channel. A coherence and cross spectral estimation program was adapted for use on the microprocessor. Modifications of the program were necessary in order to select different frequencies from the spectrum for time delay studies.

31918 (ANL—82-62, pp 501-508) **Computer controlled consolidation test results for Faraday connected MHD power generation.** Marcotte, K.; Johnson, R.; Shink, S. (Montana State Univ., Bozeman). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

MHD topping cycles of coal-fired MHD/steam combined cycle produce direct current (dc) power. This dc power must be converted to alternating current (ac) power for distribution over utility power systems. Reduction of the number of inverter systems required in a Faraday connected system for conversion from dc to ac is desireable because of cost. This reduction can be accomplished by consolidating many of the MHD generator electrode outputs before inversion between dc and ac takes place. This paper presents experimental test results for a four-electrode pair consolidation unit. The consolidation unit is computer controlled using a microcomputer and the output is supplied to a force-commutated three phase inverter system which is also under microcomputer control. The consolidation system presented is an inductively coupled circuit first proposed by R. Rosa. In the series of tests described, the four Faraday voltages are simulated with 7.5 horsepower of dc motor generator sets and the Hall voltages were simulated using six low-voltage high current power supplies. The overall operation of the consolidation/inverter system is under LSI 11/03 computer control and is discussed briefly. The test results presented indicate the electrode and Hall current sensitivity to load variations and frequency of consolidation switching.

31919 (CONF-820645—10) **Performance and economic advantages of MHD retrofit.** Dennis, C.; Berry, G.; Johnson, T.R.; Minkov, V.; Petrick, M. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83010780.

From 20. symposium on engineering aspects of magnetohydrodynamics; Los Angeles, CA, USA (14 Jun 1982).

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The retrofitting of existing power plants with an open-cycle MHD system has been re-examined in light of recent developments in heat- and seed-recovery technology. Specifically, seed-laden combustion gases are introduced into the conventional furnace under certain select conditions which will assure that the seed particles will be solid when the gas reaches the pendant superheater tube bank. To achieve these selected conditions, as well as meet the objectives of a decoupled gas and steam system, a separate (and new) low-temperature gas path has been proposed. Using this system configuration, substantial increases in efficiency were obtained. Although the analysis was performed for a specific plant (Vermilion Station No. 1 in Oakwood, Illinois) certain aspects of the cycle arrangement are typical of what would be required for other types of coal-fired power plants. As part of this re-examination of retrofit, the economic picture was also reviewed. The cost effectiveness of MHD retrofit was analyzed under three different scenarios. First, the cost of an MHD retrofit was compared against the cost of a new contentional coal-fired plant. Secondly, the cost of an MHD retrofit was compared against the cost of a scrubber retrofit. Thirdly, the economic benefit from MHD retrofit was extrapolated to larger size plants. From these economic studies it was concluded that there is a potential economic benefit from MHD retrofitting.

31920 (CONF-820645—11) **Interframe resistance and performance of small- and large-scale MHD generators.** Doss, E.D.; Picologlou, B.F. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83010565.

From 20. symposium on engineering aspects of magnetohydrodynamics; Los Angeles, CA, USA (14 Jun 1982).

The effect of reduced interelectrode resistance in MHD generators on the generator power output is investigated. The analytical model used in the investigation allows for the solution for the electric field and current density distributions in the cross plane of the generator. The power output, expressed as a fraction of the power output of a perfectly insulated generator, is found to be a function of the wall temperature, boundary-layer thickness to channel transverse-dimension ratio, and the product of interelectrode resistance and channel cross-sectional area. The interelectrode resistance is assumed to be inversely proportional to the channel transverse dimension and the variation of power-output ratio with channel size is calculated. It is found that deterioration of performance of MHD generators, resulting from reduced interelectrode resistance, diminishes with generator size and is negligible for large-scale generators, provided the interelectrode resistance remains larger than an order of 0.1 Ohms.

31921 (CONF-7411121—1) **MHD combustor designs and materials of construction.** Henry, J.M.; Kurtzrock, R.C.; Bienstock, D. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). 1974. 23p. NTIS, PC A02/MF A01. Order Number DE83008577.

From NSF-OCR engineering workshop on MHD materials; Cambridge, MA, USA (20 Nov 1974).

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This paper reviews various coal combustor designs for MHD applications and describes the conditions which the materials of construction must withstand. The effect of each of the following variables on MHD combustors is discussed: fuel type, air/fuel ratio, oxygen enrichment, and seed addition. The combustor designs are divided into two broad categories - single-stage combustion and multi-stage combustion. The single-stage combustor designs are some of those which have been operated in experimental facilities over the past decade. The single-stage combustors all experience high temperatures, on the order of 2700 K, because the MHD plasma is produced directly in the one stage. Due to the high temperature and the presence of the liquid slag, none of the single-stage combustors have been able to retain a refractory lining on the walls. The successful combustor designs have consisted of water-cooled metal walls on which a coating of slag becomes deposited during operation. This slag coating provides a protective coating for the metal walls and reduces the heat loss from the combustor. The multi-stage designs are some of those that have been proposed in developmental projects; none of these have been built at this time, some are now under construction in pilot plant facilities. Multi-stage combustors contain one or more stages of preliminary gasification or combustion prior to a final stage of high-temperature

combustion which produces the MHD plasma. The preliminary stages operate at lower temperatures than the final combustion and can be constructed with commercially-available refractory materials. Multi-stage combustors produce a relatively ash-free plasma that considerably eases the material requirements in the downstream components.

31922 **(CONF-8103165—1) Solar-powered liquid-metal MHD performance and cost studies.** Pierson, E.S.; Herman, H. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 30p. NTIS, PC A03/MF A01. Order Number DE83009025.

From 3. seminar on MHD-flows and turbulence; Beer-Sheva, Israel (23 Mar 1981).

The two-phase-generator, liquid-metal magnetohydrodynamic (LMMHD) energy-conversion concept was initially developed at Argonne National Laboratory to meet the anticipated need for an energy-conversion system compatible with liquid metal-cooled heat sources, such as the liquid-metal fast breeder reactor (LMFBR) and the controlled thermonuclear reactor (CTR). In particular, the use of two working fluids, a thermodynamic fluid (gas or vapor) and an electrodynamic fluid (liquid metal) to provide the electrical conductivity, gives LMMHD great versatility in coupling to differing heat-source temperatures and meeting material constraints, e.g., heat addition can be to the liquid metal, the gas or vapor, or both. Three LMMHD versions are under investigation.

31923 **(EPRI-AP—2942) Systems analysis and ranking of MHD power-consolidation circuits. Final report.** Kelley, F.W. (General Electric Co., Philadelphia, PA (USA)). Mar 1983. 295p. NTIS, PC A13/MF A01. Order Number DE83901984.

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In a study conducted by the General Electric Company for EPRI, a number of proposed current-consolidation systems for Magnetohydrodynamic Power Generators are described, analyzed and evaluated. Included are: high-frequency dc/ac/dc converters, buck/boost current-fed, line-commutated converters, autotransformer networks, capacitance networks, and resonant-pulse, voltage-fed line-commutated converters. For each proposed system, circuit action is described, equations for performance analysis are developed and solutions by digital computer are documented. The proposed systems have been ranked according to suitability for a large-scale MHD installation. The buck/boost system has been selected for further study and construction and test of model system. The selected system can provide the desired voltage isolation, current balance, and regulation. It will utilize techniques and components that have been accepted by the utility industry. Reliability and efficiency of similar circuits have been acceptable. A specification for performance of a large-scale consolidation system is proposed and an equivalent circuit is described which represents a limited portion of an MHD channel for either digital or analog studies.

31924 **Magnetocumulative generator.** Pettibone, J.S.; Wheeler, P.C. (to Dept. of Energy). US Patent 4,376,901. 15 Mar 1983. Filed date 8 Jun 1981. vp.

PAT-APPL-271060.

An improved magnetocumulative generator is described that is useful for producing magnetic fields of very high energy content over large spatial volumes. The polar directed pleated magnetocumulative generator has a housing providing a housing chamber with an electrical conducting surface. The chamber forms a coaxial system having a small radius portion and a large radius portion. When a magnetic field is injected into the chamber, from an external source, most of the magnetic flux associated therewith positions itself in the small radius portion. The propagation of an explosive detonation through high-explosive layers disposed adjacent to the housing causes a phased closure of the chamber which sweeps most of the magnetic flux into the large radius portion of the coaxial system. The energy content of the magnetic field is greatly increased by flux stretching as well as by flux compression. The energy enhanced magnetic field is utilized within the housing chamber itself.

3003 Thermoelectric Generators

31925 **Solid state engine with alternating motion.** Golestaneh, A.A. (to Dept. of Energy). US Patent 4,325,217. 20 Apr 1982. Filed date 21 Jan 1980. vp.

PAT-APPL-113868.

Heat energy is converted to mechanical motion utilizing apparatus including a cylinder, a piston having openings therein reciprocable in the cylinder, inlet and outlet ports for warm water at one end of the cylinder, inlet and outlet ports for cool water at the other end of the cylinder, gates movable with the piston and slidably engaging the cylinder wall to alternately open and close the warm and cool water ports, a spring bearing against the warm water side of the piston and a double helix of a thermal shape memory material attached to the cool end of the cylinder and to the piston. The piston is caused to reciprocate by alternately admitting cool water and warm water to the cylinder.

3005 Fuel Cells

REFER ALSO TO CITATION(S) 31018, 31795, 31797

31926 **(CONF-811014—4) Thermal characterization of lithium aluminate/alkali carbonate electrolyte structures.** Kucera, G.H. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83010701.

From 11. North American Thermal Analysis Society conference; New Orleans, LA, USA (19 Oct 1981).

The thermomechanical behavior and thermal stability of lithium aluminate ($LiAlO_2$) and $LiAlO_2/Li_2CO_3$-K_2CO_3 mixtures have been studied by thermal analyses. The relationships of the coefficients of linear thermal expansion (α/sub t/) of each mixture as a function of volume content of eutectic are presented. The measured transition temperatures of α- and β- phases to the γ-phase of $LiAlO_2$ are also presented. In general, the results indicate that α/sub t/ of $LiAlO_2$/eutectic increases with increasing eutectic content and that additives such as LiOH, Li_2CO_3-K_2CO_3, and γ-Al_2O_3 can affect the α- and β- to γ-$LiAlO_2$ transition temperatures by 100 to 250°.

31927 **(CONF-820508—11) Review of cathode development for molten-carbonate fuel cells.** Pierce, R.D.; Smith, J.L.; Poeppel, R.B. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 28p. NTIS, PC A03/MF A01. Order Number DE83010085.

From Spring meeting of the Electrochemical Society; Montreal, Canada (9 May 1982).

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At the cathode of a molten-carbonate fuel cell, CO_2, oxygen, and electrons from the external circuit form carbonate ions that migrate through the electrolyte to the anode. Several materials have been used, but by the 1970's, lithiated nickel oxide was the accepted cathode material. Porous electrodes were prepared by in-cell oxidation and lithiation of porous nickel plaques. Advances were made recently in preparing nickel oxide cathodes out-of-cell to avoid problems of dimensional change and to provide better microstructure tailoring. These cathodes are readily lithiated in-cell to achieve semiconducting properties. In mid 1981, it was demonstrated that nickel dissolution and mass transport into the electrolyte structure from lithiated nickel oxide cathodes was excessive under planned power-plant operating conditions. Accordingly, a concentrated effort is underway to find a better cathode material.

31928 **(DOE/CS/40152—T2) Load effects of Nola-type induction motor power-factor controllers on fuel-cell inverters.** (Army Mobility Equipment Research and Development Command, Fort Belvoir, VA (USA). Electrical Power Lab.). 31 Dec 1982. Contract AI01-79CS40152. 74p. NTIS, PC A04/MF A01. Order Number DE83011689.

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This report covers tests performed on power inverters using Nola-type power factor controllers (PFC) and fractional horsepower single-phase induction motors as loading devices. The inverters

were designed for integral operation with fuel cell power plants and represented four differential developmental designs ranging in power ratings from 1.5 kW to 5 kW. In addition, a 1000 VA commercial aircraft-type inverter was also tested. Results are presented and discussed.

31929 **(DOE/MC/16242—6) Hot-gas cleanup for molten carbonate fuel cells: dechlorination and soot formation. Quarterly report, September 16-December 15, 1982.** Gelb, A.; Ham, D.; Lord, G. (Physical Sciences, Inc., Andover, MA (USA)). 1982. Contract AC21-81MC16242. 26p. (PSI-TR—382). NTIS, PC A03/MF A01. Order Number DE83011368.

The objective of this program is to screen and test alkali containing minerals as candidate chloride (HCl) sorbents. The goal is to develop a hot gas process for the removal of HCl from low Btu coal derived fuels for use in MCFC's. Previous analysis at PSI determined the potential of candidate sorbent materials for high temperature removal of HCl from coal gasifier effluent. Results of that work showed that only alkali carbonates will reduce HCl levels below the ppMV levels necessary for MCFC's at temperatures up to 800°K and that above 800°K, chloride could not be reduced below ppMV levels. The present experimental task was designed to follow up the recommendations based on these results. It was designed to provide empirical information necessary for the definition of a hot gas chloride cleanup system. The program proceeds in several stages: (1) screening of alkali containing minerals for potential reactivity, cost and availability; (2) testing of potentially attractive minerals by measuring reaction with HCl in a PSI hot flow reactor with simulated coal gasifier effluent; and (3) determining reaction rates and candidate sorbent capacities. This quarterly report presents the results of our sorbent screening survey which indicate that the naturally, occurring mineral Shortite is the leading candidate for a hot gas HCl cleanup sorbent. Shortite is an abundant mineral not used commercially at this time. Occurrence and preparation of Shortite are discussed. Thermochemical estimates for Shortite bed capacities and maximum operating temperatures are also presented. (WHK)

31930 **(DOE/NASA/0198—1) Optimization and fabrication of porous carbon electrodes for Fe/Cr Redox flow cells.** Jalan, V.; Morriseau, B.; Swette, L. (Giner, Inc., Waltham, MA (USA)). Jul 1982. Contract AI04-80AL12726. 155p. (NASA-CR—167921). NTIS, PC A08/MF A01. Order Number DE83010779.

The scope of this program was limited to negative electrode development for the NASA chromous/ferric Redox battery. The effects of substrate material, gold/lead catalyst composition and loading, and catalyzation procedures on the performance of the chromium electrode were investigated. Three alteranative catalyst systems were also examined, and 1/3 square foot size electrodes were fabricated and delivered to NASA at the conclusion of the program. The significant findings were as follows: (1) In a preliminary examination the felt substrate appeared to have considerable influence on the performance of the negative electrode. The reaction level, both for hydrogen evolution and the Cr^{3+}/Cr^{2+} Redox reaction, declined with increasing felt processing temperature over the range of 1250°C to 2300°C. In terms of charging efficiency, a felt processed at 1630°C gave the highest $Cr^{2+}:H_2$ ratio, in half cell cyclic voltammetry testing. (2) The reaction levels, both for hydrogen evolution and the Cr^{3+}/Cr^{2+} Redox reaction, were found to increase with increasing gold loading over the range of 3 to 50 g/cm_3. There were many large deviations from the relationship between the CR^{3+}/Cr^{2+} Redox reaction level and simple gold loading, however. It was found that many of the deviations could be accounted for by variations in the particular size (and surface area) of the gold deposits as determined by transmission electron microscopy. (3) The alcohol-assisted gold deposition process was scaled up, using two variations of a simple felt immersion process, without substantial change in performance. These results although consistent, appeared to be different from results obtained with electrodes prepared by NASA Lewis.

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

3201 Buildings

REFER ALSO TO CITATION(S) 31523, 31527, 31530, 31533, 31970, 32783

31931 **(CONF-780228—1) Feasibility of zero residential energy growth.** Hirst, E.; Carney, J.; O'Neal, D. (Oak Ridge National Lab., TN (USA)). Mar 1978. Contract W-7405-ENG-26. 29p. NTIS, PC A03/MF A01. Order Number DE83012100.

From AAAS meeting- Abstract cleared 9/22/77 with the title, "Is Zero Energy Growth Feasible in the Residential Sector?"; Washington, DC, USA (Feb 1978).

The effects of government regulatory, incentive, and research programs on residential energy use and household economics during the 1977 to 2000 period are examined. The basis for these evaluations is a detailed engineering-economic model of residential energy use developed at ORNL. Results of these analyses suggest that future trends in residential energy use are subject to considerable control. Estimates of energy use in the year 2000 vary by 50%. A judicious combination of government regulations (appliance efficiency standards, thermal standards for construction of new residences), incentives for weatherization of existing homes, research and development to produce new technologies can yield a future in which residential energy use in the year 2000 is at roughly the present level. Such a combined program can also provide large economic benefits to households: the reduction in the present worth (at a real interest rate of 8%) of fuel bills between now and 2000 could exceed the extra costs of more efficient equipment and structures by $60 billion.

31932 (CONF-8109203—, pp vp) **Comparing the economy of different heat pumps.** Cube, H.L. von. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The energy costs of highly technical thermodynamic heating methods amount to only ca. 1/3 or max. 2/5 of the total costs. All other costs are fixed costs, as e.g. the interest rate. The determining factors regarding the economy are the depreciation rates, the expenditure of maintenance work and the operating risk. The absorption heat pump is superior to other systems because of the following factors: - long service life, - little expenditure of maintenance and preservation, - high operating reliability. Thus it can be considered by far as the most economic heating system inspite of its slightly worse energy utilization.

31933 (CONF-8109203—, pp vp) **Energy optimization in buildings by EDP.** Brendel, T. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The study deals with the methodology of the integrated consideration of the thermodynamic behaviour of buildings in general and their energy consumption in particular. 'Integrated' means that, if possible, all energy-relevant parameters are correctly recorded and assessed in a simulation model. This is the decisive step away from the view of the 'classical' technical engineer. It is the aim of computer-aided engineering to design near buildings under the aspect of energy conservation. It also aims at sanitating existing buildings by minimizing the energy consumption resp. the investment and operating costs throughout the service life of a building or technical domestic equipment (total balance).

31934 (CONF-8109203—, pp vp) **Energy-conserving heating systems.** Siegismund, R. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The planning of energy-conserving heating systems should begin even before the heat generators are selected. The first step should be a comprehensive consideration of the building and result-

ing herefrom, an optimal construction which avoids unnecessary energy losses. Ventilation heat losses can be reduced by mechanical ventilation plants with heat recovery. Low-temperature heating, systems including exactly adapted heat generators are the basic condition for demand-orientated heating. Finally, improvements of boilers and new heating technologies with electric heat pumps, absorption heat pumps and gas-engine heat pumps are presented.

31935 (CONF-8109203—, pp vp) **Application of microelectronics.** Grosche, R. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Energy conservation and improved control by the utilization of microelectronics can be achieved in different ways. The article explains the application of microelectronics in three fields: 1. optimization systems - optimization of heating and power management with peak load release, 2. control, 3. building control systems (ZLT-G).

31936 (CONF-8109203—, pp vp) **Minimizing energy consumption in air conditioning in office buildings and industry.** Masuch, J. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The article demonstrates that the developments in space heating, ventilation and air conditioning which have been brought about by the energy crisis have lead to improvements both in the field of office buildings and industry. On one hand, these improvements can drastically reduce energy consumption, on the other, however, they do not diminish the quality of ventilation but even increase it. It shall be the task of the near future to establish the concepts developed within this scope on a broader basis and to introduce them as a new standard of technology.

31937 (CONF-8109203—, pp vp) **Two examples of large heat pump plants.** Fox, U. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The most essential epxeriences with the gas heat pump system at the sports centre of Paderborn and with the combination of a gas engine heat pump and a gas engine refrigerator in the numerical administration office of Bielefeld at the reverse point of the district heating network are presented.

31938 (DOE/CE/15148—T2) **Dual tube, counter flowing heat exchanger for turkey barns. Second quarterly report.** Wilhelm, A.A. (Wilhelm Engineering Co., Inc., Ashland, WI (USA)). Mar 1983. Contract FG01-82CE15148. 5p. NTIS, PC A02/MF A01. Order Number DE83011265.

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The installation and instrument monitoring of the heat exchanger are covered.

31939 (EGG-CSH—6223) **Assessment of the BCL and ORNL chemical heat pumps.** Rebello, W.J.; Suciu, D.F. (PAR Enterprises, Inc., Fairfax, VA (USA); EG and G Idaho, Inc., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 79p. NTIS, PC A05/MF A01. Order Number DE83011450.

Battelle Columbus Laboratory (BCL) has developed a Lithium Bromide-Water absorption heat pump, called the Battelle Temperature Booster (BTB), by modifying an absorption chiller made by Carrier Corporation. The BTB demonstration unit was designed to take energy from waste steam at 235°F and produce the equivalent of process steam at 338°F with an output of 2 MM Btu/hr. Oak Ridge National Laboratory (ORNL) has designed a LiBr-water absorption heat pump to take energy from waste water at 140°F and produce hot water at 182°F with an output of 150,000 Btu/hr. The key design feature of this unit is the adiabatic absorber. The unit was built by Arkla Industries and is now being tested at ONRL. An assessment of the BCL and ORNL absorption heat pump units in terms of their performance was performed. Since no experimental test data of the ORNL unit was available this evaluation considers mainly predicted performance.

31940 (EIR—472) **Measuring the utilization degree of oil-heated central heating boilers.** Koebel, M. (Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland)). Aug 1982. 44p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750666.

Field measurements were carried out with 20 heating systems of 20 to 300 kW built in 1967-1981 in order to determine the utilization degrees. The following parameters are determined: the relative stand-by loss (relative boiler loss in times of burner dead time), heating efficiency degree, degree of utilization that is the ratio burning time/switch-on time of the boiler. Evaluation of the measurements show that most of the inspected boilers achieve annual utilization degrees of 70 to 80%, the lower values apply to combined boilers in all-year operation, the higher values apply more to winter-operation. Only a few boilers, all of them small boilers of the one-family house category show values below 70%. The main reason for these unexpected good values is the comparatively low relative stand-by losses, which are below 3% for all tested boilers.

31941 (ENEA-RT/FARE-SDI—82-3) **Program for the numerical and graphical definition of shadows in building.** Fanchiotti, A.; Messina, M.G.; Volpe Rinonapoli, C. (Istituto Universitario di Architettura, Venezia (Italy); Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Fonti Alternative Rinnovabili e Risparmio Energetico). Nov 1982. 68p. (In Italian). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901785.

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The computer code presented here determines the shadows cast on a building's facade by surrounding obstacles, as a function of time. The program can only deal with sides parallel, or perpendicular, to the facade. The code's output is both numerical and graphical, executed by plotter. A simplified version, also presented here, determines the shadows that a building casts on the ground. The code is intended as an input stage for larger codes, simulating the thermal behavior of a building.

31942 (GA-A—17013, pp C.1-C.77) **Bound acoustic modes in heat exchanger tube bundles.** Mar 1983. NTIS, PC A05/MF A01.

In Acoustic resonance in heat-exchanger tube banks. First annual report.

Simple analytical expressions are presented for the combined influence of a tube bundle and a uniform mean flow on a damped acoustical mode bound within a tubular heat exchanger. The strategy of the analysis is to replace the physical problem of sound in fluid flowing around a tube bank with an equivalent problem of sound in an orthotropic fluid without tubes. Some of the most relevant past work is touched on briefly. Then, in Section III we define the problem to be analyzed. The analysis itself is compared with other methods. A set of numerical examples which illustrate the implications of the analysis is given.

31943 (IKE-K—64) **Analysis of thermal insulation measures realized on the basis of the Bund/Laender energy conservation programme in Baden-Wuerttemberg.** Scheirle, N.; Thoene, E.; Wartmann, R. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Feb 1981. 26p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750243.

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The evaluation of the energy conservation programme of the Land Baden-Wuerttemberg revised by the IKE, which was carried out under the aspect of energy and fuel oil conservation lead to the following result: an investment of DM 52,- would be required for all thermal insulation measures so that a litre of fuel oil could be saved per annum. This cost-benefit ratio seems very high if confronted with investigations made in comparisons of systems. The methodology of the investigation mentioned above and the scope of its results are given. The actual results are controlled by a much more detailed analysis of 152 applications concerning subsidies for thermal insulation measures. Another important aspect of this study is the investigation of the economy of the individual measures.

31944 (IKE-K—67) **Evaluation of modernization measures of residential buildings of the community Suessen under the aspects of energy conservation and economy. Pt. 1.** Scheirle, N.; Thoene, E. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Jul 1981. 58p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750244.

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The effects of a thermal insulation device with triple windows, 8 cm thick insulating slabs on the outer walls, 12 cm of glass wool insulation of the upper storey ceiling and 6 cm hard foam slabs at the basement ceiling as opposed to insulation measures using double windows, 5 cm thick insulating slabs on the outer walls, 12 cm of glass wool insulation of the upper storey ceiling and 5 cm hard foam slabs at the basement ceiling are to be investigated. The former state of the building is used as a standard of reference with energy consumption and economy being the criteria of investigation.

31945 (NP—3901171) **Simplified method to determine the influence of heat storage processes on the energy demand of air conditioning systems for large rooms.** Schramek, E.R. (Essen Univ. (Gesamthochschule) (Germany, F.R.). Fachbereich Energie-, Verfahrens- und Elektrotechnik). 19 Mar 1980. 184p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83901171.

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For rentability calculations in the projecting and operation of air conditioning systems, as well as for the solution of control problems using microprocessors the room energy demand must be mathematically defined as a function of system-specific constants, ambient air conditions, desired room air conditions, and room air load. For air transport and air conditioning (heating, cooling, moisturizing, and drying), energy demand must be presented explicitly in dependence of the influencing parameters. These are derived from the plant characteristics, from measurements by counting and by calculation. For example it must be possible to define heat storage processes in components and installations which may influence the thermal room air load by a simple algorithm.

31946 (NP—3901182) **It is dark at the bottom of the candle.** (Foerdergemeinschaft Gutes Licht, Frankfurt am Main (Germany, F.R.)). [nd]. 18p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901182.

Starting from the fact that only ca. 1% of the primary energy consumption is left for lighting this information brochure makes propaganda for better illumination. The opinions of a number of representatives from industry and politics are quoted.

31947 (PNL—3733) **Impact of improved building thermal efficiency on residential energy demand.** Adams, R.C.; Rockwood, A.D. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 82p. NTIS, PC A05/MF A01. Order Number DE83011376.

The impact of improved building shell thermal efficiency on residential energy demand is explored in a theoretical framework. The important economic literature on estimating the price elasticity of residential energy demand is reviewed. The specification of the residential energy demand model is presented. The data used are described. The empirical estimation of the residential energy demand model is described. (MHR)

31948 **Stimulating energy conservation in commercial buildings: a simulation analysis of alternative policies.** Corum, K.R.; Van Dyke, J. (Oak Ridge National Lab., TN). *Energy Policy;* 11: No. 1, 52-62(Mar 1983). Contract W-7405-ENG-26.

Using an engineering-economic model, this paper examines three alternative policies for stimulating energy conservation in the US commercial sector. The policies were constructed so that each would result in equivalent annual levels of energy use in 2000. This formulation results in a description of the level of tax credits or fuel taxes which result in annual energy-use equivalent to a given set of efficiency standards. Of the three policies examined, the tax on fuel results in the lowest cost of resources (fuel and capital) over the period. However, this policy also results in reduced amenity levels over the simulation period (1980 to 2000) and a less-efficient stock of building in place at the end of the period. 1 figure, 4 tables.

31949 (BG-Trans—5971) **Gas interchangeability as applied to the existing range of appliances.** Deschamps, Y. (British Gas Corp., London). 1982. Translation source information not available . 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901943.

The proper functioning of a range of appliances depends on, in addition to the nature of the gas, many other parameters such as the composition of the range, the installation and use of the appliances, and the adjustment of the burners. The author proposes a new method of gas interchangeability on an existing range of appliances actually in service, which takes these various parameters into account and indicates how the performance of the appliances will be altered when the nature of the gas changes. This method predicts whether or not it is necessary to make modifications to the appliances, and specifies these modifications, in order to maintain the proper functioning of the appliances, when the characteristics of the gas change. This general method has been applied to natural gases and has enabled an operating process to be established which permits the change from a L type to an H type gas. This process was tested in a prototype operation involving about 8000 customers. The results were satisfactory and the method is now being generally used in eastern and northern France.

31950 (BG-Trans—5911) **Application of statistical method to the quality control of gas appliances and to testing reliability, with particular regard to gas meters.** Dienelt, H.; Fontana, A.S. A; World Gas Conf., [Proc.], 15th *World Gas Conf., [Proc.], 15th;* 1-30(1982). 30p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901944.

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The statistical quality control of appliances is described, using long-term endurance tests on displacement gas meters as the exemplar. The control is achieved by subjecting two makes of the same type of meter (from different manufacturers) to two different working programmes. This makes it possible to define precisely the meter accuracy at different characteristic flow rates. Clearly, the results of these statistical controls are a basis for large-scale technical and financial decisions.

3202 Transportation

31951 (CONF-820128—8) **Technology assessment of productive conservation in urban transportation: an overview.** Moses, D.O.; LaBelle, S.J.; Bernard, M.J. (USDOE, Washington, DC; Argonne National Lab., IL (USA)). Jan 1982. Contract W-31-109-ENG-38. 38p. NTIS, PC A03/MF A01. Order Number DE83010735.

From 61. annual meeting of the Transportation Research Board; Washington, DC, USA (18 Jan 1982).

Travel within urban areas accounts for about one-third of all the person-miles traveled, and about 5 Quads of energy in 1975. Two energy-saving strategies were designed for this sector, aimed at minimal disruption to lifestyles and the economy while achieving the reductions in aggregate energy, especially petroleum, consumption. These productive conservation strategies were tested in three typical cities; results were expanded to national urban totals and compared to results under a reference forecast of In-Place policies. One strategy stressed group travel while the other promoted individual travel. A scenario approach was used for projection of economic and social variables. Both strategies saved energy. Trips per person declined under the Group Travel Strategy, suggesting that its greater energy savings were at the expense of some decrease in mobility. Environmental degradation and traffic fatalities impacts under Group Travel Strategy were significantly different, and better than impacts under either the Individual Travel Strategy or the In-Place Policy.

31952 (CONF-8109203—, pp vp) **Energy conservation by improving land transport.** Binnenbruck, H.H. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Corresponding to the comparable efficiency in transport the specific energy consumption ratio between road and railway is about 1.2:1. In goods traffic with lorries energy can be conserved on the technical sector of vehicle development, but also on the organizational sector of route planning and of educating and motivating the drivers towards an economic driving behaviour. Finally optimum vehicle park sizes and costs are considered.

31953 **(DFVLR-FB—82-09) Modal split in the Japanese passenger transport.** Eberlein, D. (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.)). Jan 1982. 51p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750027.

The modal split in the Japanese long distance passenger transport as well as its reasons and impacts are examined. Especially the competition between automobile and train and between train and airplane is thouroughly analyzed because the competition in Japan is completely different from that in other industrialized countries by reason of the high performance railway network. The secondary impacts are mainly treated with respect to energy consumption and traffic accidents. The investigation is preceded by a description of the demand development in comparison with the German one.

3203 Industry And Agriculture

REFER ALSO TO CITATION(S) 31390, 31797, 31932, 31942, 31984, 32000, 32044, 32215, 32267, 32271

31954 **(BMFT-FB-T—82-195) Recuperation of waste heat form flue gases containing solid particles and corrosive chemicals at high temperature.** Trappe, U. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 127p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750254.

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The most effective way to save energy in fuel consuming processes is recuperation (heating up of combustion air by the heat of flue gases). By reasons of its shape and mode of operation the cassette recuperator is less sensible to dust and corrosion than a tube bundle heat exchanger. This research programm is intended to prove that recuperation is still advantageous when heat exchangers of usual construction can't be used because of the dust content and danger of corrosion. The research project included: development of the mathematical models and computer programmes for complete systems of cassette recuperators, practical trials and measuring of performance data of a cassette recuperator installed at two soaking pit chambers of Hoesch Huettenwerke AG, long-time test for determination of life time. Cassette recuperators have under comparable conditions a life time of three years and are more economical than convective recuperators. These recuperators have to be changed every 9-15 months because of contamination and corrosion for cleaning and repair. Protective layers on the heat resisting sheets, which are tested at this time, promise a rise of durability of 50-100%. Meanwhile, cassette recuperators are installed at approx. 20 soaking pit chambers in the steel industry. It is intended to use the cassette recuperator also at furnaces in the heavy metal and aluminium industry, at glass melting furnaces and in the ceramic industry.

31955 **(CONF-830227—) Energy-efficient electric motors: their control and application.** (USDOE Bonneville Power Administration, Portland, OR). 1983. 114p. NTIS, PC A06/MF A01. Order Number DE83010764.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

Separate abstracts were prepared for seven papers. (MHR)

31956 (CONF-830227—, pp 10p, Paper 1) **Energy-efficient electric motors economics and northwest industry.** Yarborough, T.S. 1983. NTIS, PC A06/MF A01.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

Engineering and management efforts were used to investigate the application and economics of premium, energy-efficient motors of the 600-volt induction type, particularly in the 1 to 100 horsepower range.

31957 (CONF-830227—, pp 24p, Paper 2) **Energy efficient electric motors.** Glenn, M.V. (Weyerhaeuser Co., Tacoma, WA). 1983. NTIS, PC A06/MF A01.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

Good energy management involves the selection of the appropriate motor and the application of that motor for the least consumption of energy. This material focuses on the characteristics and use of the energy efficient motor.

31958 (CONF-830227—, pp 25p, Paper 3) **Overview of energy-efficient electric motor controls.** Brauner, E.J. (Rust International Corp., Beaverton, OR). 1983. NTIS, PC A06/MF A01.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

Significant energy savings are obtainable through the proper selection and application of electric motor controls. The various types of controls available and their basic prinicples and features are described. It is intended as an introduction to the subject. References are provided for those who wish to study motor controls in greater depth. A wide variety of manufacturers' literature discussing basic principles and applications as well as the specifics of the manufacturers' products is available from suppliers.

31959 (CONF-830227—, pp 3p, Paper 4) **Compressed air system control modifications.** Katz, G. (Seton, Johnson and Odell, Inc., Portland, OR). 1983. NTIS, PC A06/MF A01.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

Compressor types and controls are discussed and two case studies are presented. (MHR)

31960 (CONF-830227—, pp 9p, Paper 5) **Pumped system modifications for energy efficiency.** Madison, M. (CH2M Hill, Portland, OR). 1983. NTIS, PC A06/MF A01.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

In 1982, Eastern Oregon Company (EOFC) employed CH2M HILL to perform an energy conservation study of their 10,000-acre irrigated farm near Boardman, Oregon. The study objective was to analyze the irrigation system to determine its existing condition and recommend modifications to the system and its management that would conserve energy while delivering the same volume of water. The EOFC irrigation system consists of a complex network of pipelines and five pump stations totaling 23,350 horsepower. The modifications resulting from the energy conservation study allowed the farm to maintain maximum production and consume 30 percent less energy, saving $300,000 on their 1982 power bill. The savings in the first year were more than enough to pay for the cost of all of the modifications and the engineering. In 1983, additional fine tuning is expected to save another 15 percent of the energy required to deliver water.

31961 (CONF-830227—, pp 14p, Paper 6) **Conversion of variable speed pump control: a case study.** Wirfs, M.C.; Scholz, G.H. 1983. NTIS, PC A06/MF A01.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

Conversion of existing pumping system motor controls to more energy efficient technologies are economical and have reasonable paybacks. An actual conversion that is being implemented and will pay for itself through reduced energy consumption to the user is presented. This project resulted from an energy study and survey of an entire plant that was performed under a State of Oregon grant program. The facility is owned and operated by the Clackamas County Service District No. 1.

31962 (CONF-830227—, pp 26p, Paper 7) **Two variable speed drive studies.** Armstrong, J.N. 1983. NTIS, PC A06/MF A01.

From Symposium on energy-efficient electric motors: their control and application; Portland, OR, USA (23 Feb 1983).

As energy costs in the Northwest increase, applying more efficient drive systems becomes necessary. The cost effectiveness of modern solid state drives is changing drastically. Two applications are presented where significant savings have been realized by installing variable frequency ac drives.

31963 (CONF-8109203—) **Energy as a chance for success.** (System-Management Hans O. Rasche + Partner G.m.b.H., Heiligenhaus (Germany, F.R.); Energoplan - Vereinigte Beratungs- und Planungsunternehmen e.G., Frankfurt am Main (Germany, F.R.)). 1981. 74p. (In German). NTIS (US Sales Only), PC A16/MF A01. Order Number DE83901273.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

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These proceedings contain 34 lectures, which can be classified into six topics: 1. energy - not only a cost factor but also a chance for success, 2. alternative energy for production and administration, 3. energy utilization and energy recovery, 4. energy optimization by planning and control, 5. national promotion programmes, 6. economic and organizational aspects of energy conservation measures. 28 of these lectrues were recorded with abstracts.

31964 (CONF-8109203—, pp vp) **Rationalization - one of the most profitable investments for the future.** Cube, H.L. von. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The increase index for light fuel oil has been 13,5% per anuum for the past 20 years. In a compilation of the balances of 2000 limited companies in the F.R. of Germany the author demonstrates how the share of energy costs has increased from ca. 3% since 1970 to ca. 5% in 1980, at the same time the profit rates have dropped from 1.7% to 1.3%. A prognosis says that the share of energy costs shall increase to ca. 7.5% in 1985 and ca. 11% in 1990 if no energy conservation investments are made. Moreover, the author shows that such investments achieve an average yield of 30%. Various conservation measures are possible: organizational measures, regenerative or recuperative heat recovery systems, heat pumps for waste heat utilization, internal power generation, cogeneration, combinations of the systems. Finally one example from the beverage industry and one from the metalworking industry are presented.

31965 (CONF-8109203—, pp vp) **Novelties in industrial energy conservation.** Schraft, R.D. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The author describes two cases from the work of the Fraunhofer-Institut fuer Produktionstechnik und Automatisierung (IPA). Case no. 1 had investigated the improvement of the drying of surfaces by air jets (car wash devices). As the ventilator, feed pipes and nozzles were optimally adapted to the air current and, especially, the optimum exit angle between air jet and surface was determined, a better drying result could be finally achieved by a third of the original performance rate. The second example investigates the material, energy and cost situation of the lacquering of automobile bodies. This exact analysis is the unalterable condition for energy and cost conservation.

31966 (CONF-8109203—, pp vp) **Measuring devices developed for energy conservation in metallurgy.** Knueppel, R.; Risse, W. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

As exemplified by a medium-scale firm producing and selling measuring devices, it is demonstrated how the firm adapted itself to the changed market situation in the steel industry - the chief consumer of the products - by reorganizing its own marketing concept. The new marketing strategy consisted of creating an offer of energy-saving solutions for the domestic and foreign steel industries. Electromechanical weighing devices and special temperature gauges shall remain the main products. Two selected examples show in conclusion how energy can be conserved in blast furnace operation by using these products.

31967 (CONF-8109203—, pp vp) **Energy conservation by increased conversion yield.** Schmitter, W. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The positive experiences made with the Recitherm calorific value plant for the utilization of the flue gas heat of gas-fired heat generators in heating technology justify the application of this system also in industrial fuel engineering. Depending on the temperature, either process steam, thermal or process heat, or heat for the heating of service water are produced. The function and control of flue gas heat exchangers in the collecting pipes of several heating plants are explained in detail.

31968 (CONF-8109203—, pp vp) **Energy conservation by heat recovery.** Beck, E. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Energy recovery can only be a part of the whole energy concept. In most cases a difference is made between energy production and energy consumption. As it is the chief aim, apart from rational energy production, to curb consumption, it is sensible to obtain a clear idea of the individual energy consumers within the system. This requires much detailed work and measurements, however, it shall then be possible to deal with the various problems more intensively. The following items have to be considered especially with regard to energy recovery: - recording of the channeled wastes, e.g. waste air, flue gas waste waters; assessment of the usable energy contained in these wastes (temperature, moisture, volume, specific weight, specific heat); can this energy be used. (simultaneity, partial utilization, storage, another system); are there any technical difficulties. (local factors, corrosion, temperature, pollution).

31969 (CONF-8109203—, pp vp) **Energy conservation by using wear-resistant materials.** Mauritz, W. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

According to most recent estimations the losses by friction and wear amount to more than 10 billion DM in the F.R. of Germany. These losses can be reduced by systematically applying the findings of tribology. Linings made of artificial basalt have proved extraordinarily successful for equipment conveying solid and fluid goods. The service life of pipes and shaped parts could be extended by a factor of more than twenty. A comparison with steel and PVC pipes showed that in most cases the pipes lined with artificial basalt had the lowest floor resistance rate and thus the highest conservation rate of the energy produced. Several figures document some examples for phenomena of wear and for the solution of the problem by linings made of artificial basalt.

31970 (CONF-8109203—, pp vp) **New possibilities of lighting systems; utilization of new illuminants in artificial light equipment.** Dohrmann. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The intensity of illumination in firms is determined by the 'safety rules', the 'working place regulations' and by DIN 5035. The author illustrates in detail how energy and costs can be saved in this field by the sensible arrangement, control and utilization of new lamps (e.g. metal steam lamps). On account of the design of these lamps a major part of the energy fed into the lamps can be drained from the room as heat. Thus this energy can be used via heat exchangers or heat pumps in the heating system during the winter.

31971 (CONF-8109203—, pp vp) **Motivation of personnel to suggest new measures for energy conservation.** Zachrich, A. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The author describes in detail how a competition of ideas concerning energy conservation in a firm was organized. The staff were involved by general bonuses and a special bonus according to the rules of participation in suggesting technical improvements in firms.

31972 (CONF-8109203—, pp vp) **Industrial energy conservation.** Baller, G. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The cases described here are the reason for the demand for not considering energy conservation measures separately but for enhancing energy conservation systematically. This requires profound preparations made for the project and a phase of acquiring data. Then investigations on the reduction of the energy demand must be made before the energy supply system is adapted to the near demand structure, and - last not least - the project must be checked continually so that deviations can be determined and further measures can be planned and established if e.g. the energy prices keep on rising.

31973 (CONF-8109203—, pp vp) **Organizational measures for the realizing of an energy conservation programme.** von Essen, U. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Serious studies which analyze the energy conservation potentials of industrial firms have estimated the decrease rate of energy consumption at 20-35%. The conservation potential is dependent on the processes used in the respective firms when realizing their production. On account of its multifarious and different industrial activities the Philips Concern aims at achieving an energy conservation rate of 25%. A period of five years is available for the realization of this programme which had been stated early in 1980.

31974 **(ENEA-RT/FARE-URE—82-4) Conserving energy via cogenertion.** Celozzi, M. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Fonti Alternative Rinnovabili e Risparmio Energetico). 1982. 257p. (In Italian). NTIS (US Sales Only), PC A12/MF A01. Order Number DE83901787.

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This paper describes the contribution and possible role of cogeneration in the sphere of rational use of energy resources, taking into account its technological and methodological implications. Thermodynamic, economic, and systemic analysis methodologies have been investigated; available technological solution for cogeneration have been identified, examining performance, advantages and disadvantages. Using a real case, validity of the adopted approach has been confirmed.

31975 **(GA-A—17013) Acoustic resonance in heat-exchanger tube banks. First annual report.** Blevins, R.D. (GA Technologies, Inc., San Diego, CA (USA)). Mar 1983. Contract AT03-82ER12023. 77p. NTIS, PC A05/MF A01. Order Number DE83011413.

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A study of the fluid mechanics of acoustic resonance in heat exchanger tube bundles has been initiated. Three phases of work have been performed: (1) review of data and theory; (2) development of a model for the acoustics of tube bundles; and (3) construction of a tube bundle wind tunnel and a tube array model. The review indicates that at present there are no predictive tools or experimental measurements of acoustic damping in tube bundles or of acoustic mode shape with flow. The acoustic model provides these predictors, which will be compared with measurements in the wind tunnel. A nonlinear, fluid dynamic model for vortex shedding will be developed to provide a fluid mechanics forcing function for the acoustic model. Separate abstracts were prepared for two papers.

31976 **(JPL—9950-793) Assessment of critical-fluid extractions in the process industries. Energy Conversion and Utilization Technology (ECUT) Program: biocatalysis research activity. Final report.** (Critical Fluid Systems, Inc., Cambridge, MA (USA)). Apr 1982. Contract AI01-81CS66001. 39p. NTIS, PC A03/MF A01. Order Number DE83011253.

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An assessment of the potential for critical-fluid extraction as a separation process for improving the productive use of energy in the process industries is presented. Critical-fluid extraction involves the use of fluids, normally gaseous at ambient conditions, as extraction solvents at temperatures and pressures around the critical point. Equilibrium and kinetic properties in this regime are very favorable for solvent applications, and generally allow major reductions in the energy requirements for separating and purifying chemical components of a mixture. A brief overview is provided of the fundamental characteristics of critical-fluid extraction, with emphasis on the unique properties of fluid systems that are used to advantage in the technology. Also described is the impact of these process characteristics on the potential for improved energy productivity. The list of high-payoff potential candidate applications is described, plus the criteria used to narrow these to provide appropriate candidates. Estimates are presented for the energy-productivity potential for the candidate applications. These estimates, while preliminary, take into account the current energy requirements of production as now practiced, and the production volumes involved. An outline of long-term research and development needs is presented.

31977 **(N—8229711) State of and prospects for automation of energy-supply sources of iron and steel industry enterprises.** Kryukov, G.Y.; Lyambakh, R.V.; Lyashenko, L.E.; Sergeev, A.D. (British Library, Boston Spa. Lending Div.). Jul 1982. 8p. (BLLD-M—26558-(5828.4F)). Avail: British Library Lending Div., Boston Spa, Engl.

Automation at various levels of items of the energy management of enterprises belonging to the iron and steel industry is considered in the light of recent developments and the energy-supply situation as a whole. Examples of benefits obtained through automation are given.

31978 **(NP—3901287) Saving of energy by the use of the adsorption-activated sludge process (A-A-treatment).** Boehnke, B.; Gethke, H.G. (Technische Hochschule Aachen (Germany, F.R.). Lehrstuhl und Inst. fuer Siedlungswasserwirtschaft). 1981. 129p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901287.

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The specific oxygen demand of the A-B-Treatment will be ascertained by general known contexts. The highest energy saving will be reached, if with a high sludge loading in the first aeration step a high effect is possible. The A-B-Treatment has definetly the lowest oxygen demand in comparison to other variations of the sludge aeration process. In order to prove the calculated values, investigations to minimize the energy were accomplished at semi- and technical pilot plants.

31979 **(NZERDC—86) Cogeneration of heat and electricity in a spray drying plant.** Lovell-Smith, J.E.R.; Vickers, V.T. (New Zealand Energy Research and Development Committee, Auckland). Jan 1983. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901716.

The feasibility of the cogeneration of heat and electricity has been studied for a milk powder factory. Measurements of fuel and electricity consumption relative to the powder production were taken at the factory over a two-year period. Budget quotations from manufacturers of suitable packaged turbo-alternator plant were obtained in 1979, and again in 1981 to permit economic feasibility studies to be carried out. The most economically viable of the

many schemes considered envisages the use of a gas-fired turbo-alternator for in-plant electricity generation connected in parallel with the electricity supply from the local power supply authority. The scheme includes the use of the hot turbine exhaust gases for direct heating of the drying air for the spray drier and supplementary gas firing to achieve good air temperature control. It is calculated that the reduced cost of the electrical power resulting from in-plant power generation should ensure a capital repayment time for the recommended cogeneration scheme of approximately 5 years. Recommendations are also made to permit all dairy companies, with access to a natural gas pipeline, to evaluate the approximate economics of cogeneration at their plants before making a more detailed evaluation.

31980 **(PB—83-133488) Industrial residue management altenatives for Allegheny County (Pittsburgh) Pennsylvania. Final report 1 Aug 75-31 Jul 77.** Martin, E.J.; David, J.J. Jr. (Environmental Quality Systems, Inc., Rockville, MD (USA)). Nov 1982. 254p. NTIS, PC A12/MF A01.

Major generators of wastewater treatment, air pollution control and production process residues in Allegheny County, Pa., were identified and contacted for the determination of current and future amounts of residues generated. Data developed through the survey and a literature review were utilized to estimate total residue generation by all industrial sources within the county. Estimates for 45 categories of industrial residues are presented for 1977 and 1983. Information on current residue reclamation, treatment and disposal practices by industries in the county is presented. A computer analysis of costs for transporting wastes to several proposed central treatment facility locations within the county was performed. Three alternatives for management of projected residue quantities within the county were formulated. A cost analysis of the alternatives found that an environmentally acceptable management plan for all residues generated within the county could be implemented at a total cost comparable to maintaining existing practices.

31981 **(PB—83-150375) Lower net pressure reverse osmosis membranes and systems - cost and performance advantages and limitations. Final report.** Kremen, S.S.; Hull, C.E.; Jhawar, M. (Kremen (Seymour S.) and Makhan Jhawar, Coronado, CA (USA)). Jun 1982. 114p. NTIS, PC A06/MF A01.

Reverse osmosis systems are generally designed and utilized on the basis of reference membrane water flux and desalting performance at 400 psi net driving pressure (NDP). Membranes now being offered and tested at a preliminary commercial stage are capable of equivalent performance at 200 psi NDP. These membranes offer immediately obvious savings in energy costs for reverse osmosis desalting and water reclamation. In addition, they can make a most important contribution to reduced membrane replacement costs and improved permeate quality when operating on high salinity feeds at higher recovery levels. A number of hypothetical cases were developed and tabulated, assuming a 200 psi NDP sea water membrane was available. Substantial benefits could be expected if such a membrane could be developed and reduced to practice. Additional cost savings and performance improvements can be realized by operating the 200 psi NDP membranes at somewhat higher applied pressures which preserve or enhance NDP.

31982 **Viscous sludge sample collector.** Beitel, G.A. (to Dept. of Energy). US Patent 4,376,392. 15 Mar 1983. Filed date 11 Aug 1981. vp.

PAT-APPL-291898.

A vertical core sample collection system for viscous sludge. A sample tube's upper end has a flange and is attached to a piston. The tube and piston are located in the upper end of a bore in a housing. The bore's lower end leads outside the housing and has an inwardly extending rim. Compressed gas, from a storage cylinder, is quickly introduced into the bore's upper end to rapidly accelerate the piston and tube down the bore. The lower end of the tube has a high sludge entering velocity to obtain a full-length sludge sample without disturbing strata detail. The tube's downward motion is stopped when its upper end flange impacts against the bore's lower end inwardly extending rim.

3206 Municipalities And Community Systems

REFER ALSO TO CITATION(S) 31907, 31978, 32090

31983 **(CONF-7511155—1) Energy from organic wastes: comparison and update.** Fu, Y.C. (Energy Research and Development Administration, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). 1975. 16p. NTIS, PC A02/MF A01. Order Number DE83008214.

From International congress of scientists on the human environment; Kyoto, Japan (17 Nov 1975).

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Various conversion processes to recover energy from organic wastes and biomass were reviewed and compared. Combustion of wastes to produce steam gas gained considerable attention industrially. Applications of other processes for converting organic wastes to gaseous and liquid fuel including hydrogasification, pyrolysis, bioconversion-fermentation, and liquefaction are potentially significant as they represent a supplemental source of energy supply. The pyrolysis process is currently being tested on a relatively large scale, and the process economics are expected to improve with the increasing price of the recovered products. The development of the bioconversion-fermentation process to produce substituted natural gas is advancing to the stage of large scale demonstration, and is a serious contender for making fuel gas from organic wastes and biomass. Methane recovery has yet to be proved economically feasible on a large scale, but its potential could well be enormous. The development of the hydrogasification and liquefaction processes should advance with the progress of coal gasification and liquefaction technologies.

31984 (CONF-8109203—, pp vp) **Energy from residual materials.** Howald, P. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Pyrolysis plants are economically interesting for the decentralized combustion of the available, partly high-grade residual materials because they are environmentally safe as they can produce heat on the premises also from those materials which are difficult to burn. Thus there are no transport costs and heat distribution costs. The future increasing energy prices compel us to utilize all sources and at the same time, to preserve our environment as much as possible.

31985 (CONF-8109203—, pp vp) **Energy conservation by materials recycling and waste utilization.** Bracker, G.P. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

The fast swelling up of the quantities of waste in the industrial states leads to increasing environmental burdens. The recovery of raw materials and the reactivation of energy from wastes offers a solution of the problems. In the ECO-BRIQ method briquet-shaped fuel is produced from domestic wastes. Its calorific value equals the value of hard brown coal. The fuel can be stored and transported without any problems.

31986 (CONF-8109203—, pp vp) **Energy conservation by cogeneration.** Scholz, F. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

Apart from the direct use of industrial waste heat for domestic heat supply which, however, is locally limited there is no other heating technology which, like cogeneration, could conserve primary energy to a considerable extent. Thus cogeneration can especially substitute the limited, expensive and mainly imported energy carriers like petroleum, and gas. This technology, although available is still capable of development. It can contribute considerably to energy conservation in general, to the substitution of petroleum and gas and thus to relieving our balance of payments and the unemployment problem if initial bottlenecks in financing can be done away with.

31987 **(DOE/CS/20432—1) Solid-waste-management study: Logan County, West Virginia.** (Logan County Commission, WV (USA); Howard-Needles-Tammen and Bergendoff, Charleston, WV (USA)). Mar 1983. Contract FG01-78CS20432. 221p. NTIS, PC A10/MF A01. Order Number DE83011053.

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The study of a solid waste disposal/resource recovery project is reported. Important technical findings and cost estimates are discussed that should permit local decision makers to select an alternative for solid waste disposal. The main goals of the solid waste generation and resource recovery marketing study for Logan County were the determination of a solid waste generation rate and the selection of a potential customer of a resource recovery fuel, energy, or material. Also included are an environmental assessment, and institutional and financial considerations. Applicable regulations and guidelines are appended. (LEW)

31988 **(DOE/CS/40337—14-Vol.1) Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 1. Project overview.** (Chicago Dept. of Planning, IL (USA)). Dec 1982. Contract FG02-80CS40337. 46p. NTIS, PC A03/MF A01. Order Number DE83009704.

The project addresses the identification and resolution of institutional, legal and economic issues of cogeneration in the urban environment. It also focuses on technical matters particularly, including the thermal-economic analysis of cogeneration within the context of regulation, financing, design, and optimization. The work is applied using a case study approach to cogeneration opportunities identified by a survey of industries and institutions in the City of Chicago in cooperation with Peoples Gas Company and Commonwealth Edison Company. The project attempts to bring to the attention of the industrial-commercial sector the opportunities and benefits of cogeneration in conserving energy and stimulating economic development.

31989 **(DOE/CS/40337—14-Vol.2-App.C) Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 2. Appendix C: site profiles.** (Chicago Dept. of Planning, IL (USA)). [nd]. Contract FG02-80CS40337. 404p. NTIS, PC A18/MF A01. Order Number DE83010335.

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The profiles of potential sites for urban integrated industrial cogeneration systems analysis in the City of Chicago contain the baseline data used in evaluating the 34 potential sites for cogeneration applications. The following information is included for each site: site location, site profile, site layout, energy consumption profiles for inventoried firms and facilities, available vacant industrial sites, and zoning ordinance map.

31990 **(DOE/CS/40337—14-Vol.3) Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 3. Regulatory and tax aspects of cogeneration development in Chicago. Energy Management Report CDP-82-2.** (Chicago Dept. of Planning, IL (USA)). Dec 1982. Contract FG02-80CS40337. 43p. NTIS, PC A03/MF A01. Order Number DE83010336.

The analysis of the legal aspects of cogeneration involved an evaluation of federal, state and local regulatory and financial incentives and restrictions affecting the planning and development of cogeneration projects in the City of Chicago. Two areas were of particular importance. The first is the impact of the Public Utility Regulatory Policies Act of 1978 which provides a market for power sales by cogenerators and exempts them from utility-type regulation. The second concerns recently enacted changes to the Internal Revenue Code which provide tax-related incentives for cogeneration project financing, such as energy tax credits, accelerated depreciation and modified leasing rules.

31991 **(DOE/CS/40337—14-Vol.4) Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 4. Environmental aspects of cogeneration development in Chicago. Energy Management Report CDP-82-3.** (Chicago Dept. of Planning, IL (USA)). Dec 1982. Contract FG02-80CS40337. 92p. NTIS, PC A05/MF A01. Order Number DE83010329.

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A summary of environmental concerns related to the operation of cogeneration facilities in Chicago is presented. The environmental regulations and permitting processes applicable to these facilities are outlined also. Finally, since the environmental effects and regulations will vary according to the technology and fuel utilized in a particular application, emission estimates by the Illinois Environmental Protection Agency are included for five alternate cogeneration systems considered for the Chicago area.

31992 **(DOE/CS/60119—T1) Source separation and recycling: a Connecticut guide.** (Connecticut Office of Policy and Management, Hartford (USA)). Feb 1981. Contract FG41-77CS60119. 127p. NTIS, PC A07/MF A01. Order Number DE83010906.

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Source separation is a method in which the generator of waste materials selectively collects, segregates, and stores desirable components of the waste stream so that they may be reintroduced into the materials market for reprocessing. Market selection, administration, market arrangements, collection and processing equipment, materials preparation, and public education are discussed. The Case Studies illustrate how several different municipalities handle source separation. These municipalities were chosen to represent cities and towns of various sizes, geographic location, and programmatic approaches. A white paper recycling program in state office buildings is also described. Tabulations (alphabetical by town) include potential markets, on-going recycling programs, and used oil haulers licensed in Connecticut. Possible sources of funding and labor for recycling activities, pertinent legislation, and information references for more indepth study are also contained therein.

31993 **(EGG-PSE—5974) Energy from municipal solid waste: mechanical equipment and systems status report.** Hainsworth, E.; Mayberry, J.L.; Piscitella, R.R. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 238p. NTIS, PC A11/MF A01. Order Number DE83011449.

The state of the technology for the mechanical equipment used in systems producing refuse-derived fuel (RDF) is summarized. Emphasis is on size reduction and separation equipment. Densifiers, storage facilities, conveyors, and material recovery equipment are also discussed. Fourteen RDF plants were visited to obtain information on operating experience. Operating problems and solutions are discussed for each type of equipment. The results of several testing programs are also presented in abbreviated form.

31994 **(NP—3901272) Technical Works of Stuttgart AG - annual business report 1981.** (Technische Werke der Stadt Stuttgart A.G. (Germany, F.R.)). 1982. 51p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901272.

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The companies activities are supply of electricity, gas, water and destrict heat (cross network interlinking the individual stations), and tasks of telecommunication of Stuttgart city administration. The annual report contains a description of structure and activities of thus utility plant. Furthermore it comprises the report of the board of directors and explanations on the annual accounts of 1981. The annual balance sheet and the profit and loss account are provided additionally.

31995 **(PB—83-128629) Institutional constraints and public acceptance barriers to utilization of municipal wastewater and sludge for land reclamation and biomass production.** Deese, P.L.; Miyares, J.R.; Fogel, S. (Urban Systems Research and Engineering, Inc., Cambridge, MA (USA)). Jul 1981. 109p. NTIS, PC A06/MF A01.

This study has involved an analysis of the institutional constraints and public acceptance barriers to the development of full scale projects utilizing sewage sludge in land reclamation and biomass production. Public opposition to land application projects is generally initiated by a small group with a very strong anti-project bias. Public officials, in local government or regulatory agencies, may also be opposed to a proposed project and can frequently use their authority to impede development. Compliance with the various institutional and regulatory requirements is a project's first line of defense.

31996 **(PB—83-128942) Recycling opportunities for neighbourhoods and communities.** Thomas, C. (Open Univ., Milton Keynes (UK). Alternative Technology Group). Oct 1981. 27p. NTIS, PC E04/MF E04.

This paper discusses recycling paper, glass, plastics, and metals. It presents a community technology approach to recycling, and reviews present efforts in repair and renovation, reuse, and recycling. A final chapter on the appropriateness of recycling technologies to neighborhoods and communities concludes that only a paper recycling plant can be supported by a neighborhood (100 people) and a pulp packaging unit would require a community (1000 people). A district (10,000) people would be required to support a small-scale cellulose insulation manufacturing plant, 100,000 people are needed to support a glass/resin tile production plant, and 1,000,000 people are needed to support small-scale aluminum smelting.

3209 Education And Public Relations

31997 **(DOE/CE—0023/2) Comprehensive program and plan for federal energy education, extension and information activities. The sixth report to Congress. P.L. 95-39, Title V, Section 508, National Energy Extension Service Act and P.L. 96-294, Section 404, Energy Security Act.** (USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC). Mar 1983. 87p. NTIS, PC A05/MF A01. Order Number DE83012095.

The broad purpose of the FY 1982 activities was to inform the government and private sector about the technologies to conserve energy and to utilize renewable energy sources. The current approach to federal energy information activities places reliance on the following centralized channels: publication of results of programs through DOE's Technical Information Center (TIC), the National Technical Information Service of the Department of Commerce, and the Government Printing Office; maintenance by TIC of bibliographic data bases and abstracting capabilities; utilization of appropriate inquiry and referral services; and selective announcements of availability of data or reports. In addition to R and D activities, the following federal incentives complemented the FY 82 energy information activities: increased US exports, business incentives, loan guarantee program, business energy tax incentives, business energy investment credits, state energy conservation planning grants, energy extension service, appropriate technology small grants, weatherization assistance program, residential tax credit, vanpool investment tax, and schools/hospitals grants. Information activities are reported for the following federal agencies: ACTION, Department of Agriculture, Department of Commerce, Department of Energy, Department of Health and Human Services, Department of Housing and Urban Development, Small Business Administration, Tennessee Valley Authority, and Department of Transportation. (MCG)

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS

3301 Internal Combustion Engines

REFER ALSO TO CITATION(S) 31348, 32001

31998 **(DOE/BC/10362—10) Evaluation of improved materials for stationary diesel engines operating on residual and coal-based fuels. Final report.** West, A.I.; Carignan, F.J.; Syniuta, W.D.; Cannon, R.M. Jr. (Advanced Mechanical Technology, Inc., Newton, MA (USA)). Mar 1983. Contract AC19-80BC10362. 95p. NTIS, PC A05/MF A01. Order Number DE83007003.

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An investigation of materials which must function in present and future diesel engines is described. The quality of the petroleum based fuels available for stationary engines is steadily declining, and the engine ratings are steadily increasing. If the modern, highly efficient diesel engine is to retain its place in the power generating field, advances in the tribology of engine components are required. This is even more important if these engines are to burn successfully residual fuels and the coal-based liquid fuels and coal-oil slurries which will replace the more refined petroleum based fuels. This progam evaluates ceramic coatings and monolithic ceramics which could be incorporated into the design of stationary piston engines to allow: the use of fuels which are considerably below current standards as regard to corrosive and abrasive contaminants. These fuels include low grade residual oils from petroleum stocks, coal-based liquid fuels, and coal-oil slurries, as outlined in the Alternative Fueled Stationary Diesel National Program, Division of Power System, the Department of Energy, April 1978; operation at higher mean effective pressure to increase the efficiency and reduce the size of the engine; and a reduction in wear of critical components to thereby increase the engine's service life. Recognizing the complexity of a subject such as friction and wear in a reciprocating engine with the many possible interactions of wear mechanisms, materials, lubricants, surface condition and finish, operating conditions, etc, the program includes the identification and characterization of potential materials which might be incorporated into existing engine designs; screening of these materials with relatively simple laboratory apparatus especially designed for this purpose; SEM analysis of the wear surfaces; and the development of an accelerated wear test utilizing a single-cylinder diesel engine burning a coal-oil mixture.

31999 **(DOE/NASA/50194—37) Characterization of a high-pressure diesel-fuel injection system as a control-technology option to improve engine performance and reduce exhaust emissions.** McFadden, J.J.; Dezelick, R.A.; Barrows, R.R. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Mar 1983. Contract AI01-80CS50194. 35p. (NASA-TM—83329). NTIS, PC A03/MF A01. Order Number DE83011334.

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Test results from a high-pressure electronically controlled fuel injection system are compared with a commercial mechanical injection system on a single cylinder, diesel test engine using an inlet boost pressue ratio of 2.6:1. The electronic fuel injection system achieved high pressure by means of a fluid intensifier with peak injection pressures of 47 to 69 MPa. Reduced exhaust emissions were demonstrated with an increasing rate of injection followed by a fast cutoff of injection. The reduction in emissions is more responsive to the rate of injection and injection timing than to high peak injection pressure.

32000 **(EGG-FM—6189) Fouling of a finned-tube heat exchanger in the exhaust of a stationary diesel engine. Final report.** Henslee, S.P.; Bogue, J.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 86p. NTIS, PC A05/MF A01. Order Number DE83012089.

The final phase of work in the Heat Exchanger Technology Program sponsored by the Energy Conversion and Utilization Division of the US Department of Energy (DOE) is described. A subscale finned-tube heat exchanger was operated on the exhaust stack of a 1.5-MW stationary diesel engine to determine the heat-transfer degradation due to fouling and corrosion. Transient behavior of the overall heat-transfer coefficient, fouling resistance, and calculated pressure drop are reported, as well as physical observations of the foulant deposited on the finned surface. Near-asymptotic fouling behavior was observed after 200 hours of operating time.

3302 External Combustion Engines

32001 (DOE/NASA/51040—43) Implementation of R and QA practices in R and D programs. Bankaitis, H. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1983. Contract AI01-77CS51040. 17p. (NASA-TM—82997; CONF-830535—1). NTIS, PC A02/MF A01. Order Number DE83010408.

From 37. annual American Society for Quality Control congress; Boston, MA, USA (24 May 1983).

DOE has established a number of broad programs aimed at reducing fuel consumption. Several programs address the R and D of ground transportation propulsion alternatives ot the conventional spark-ignition engine. NASA Lewis is responsible for managing the effort between the Government and industry teams involving American and foreign companies. Thus, existing NASA SR and QA procedures were modified/adapted to these R and D programs and implemented to assure that the test hardware design intent was met, the hardware was not hazardous to personnel, it would demonstrate reliable operation, and it would help establish the future R and D quality assurance and maintainability requirements. This successful low-cost approach might be applicable to other similar projects.

3303 Electric-powered Systems

REFER ALSO TO CITATION(S) 31790, 31792, 31794, 32008

32002 (CONF-820814—45) Design considerations for a lithium-aluminum/iron sulfide electric-vehicle battery. Chilenskas, A.A.; Gay, E.C.; Kawahara, K.; Goto, K.; Shimotake, H.; Barney, D.L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83010778.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

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A study on battery-vehicle design interactions was performed jointly by Argonne National Laboratory and Toyota Motor Company. A Toyota Carina converted to electric drive was used to model the performance of an electric vehicle (EV) powered by a lithium-aluminum/iron sulfide battery. Energy and power requirements for the EV were calculated, based upon achieving a range of 120 or 200 km with acceleration requirements typical of today's internal-combustion automobiles. Cell-modeling analysis was employed to relate the battery power/energy, p/e (h^{-1}), to its specific energy. Battery weights and volumes were derived for the required conditions.

32003 (DOE/ET/25411—T1) Review of economic and technical analysis and identification of important factors for implementation of the construction phase for the Rapid-Transit Battery-Storage Project. Final report. (Gibbs and Hill, Inc., New York (USA)). 1981. Contract AC02-79ET25411. 54p. NTIS, PC A04/MF A01. Order Number DE83012101.

This study is part of the Rapid-Transit Battery-Storage Project which has determined the technical and economic feasibility of using a battery storage system to reduce the peak electric demand of the New York City Transit Authority (NYCTA). This study provided support to New York State Research and Development Authority (NYSERDA) in three ways, i.e., the economic and technical analyses performed by the systems manager, the Garrett Corp., were reviewed; the obstacles to the construction phase of the project were determined, including permits needed and the environmental effects of the project; and a computer simulation of part of the transit system was made to determine instantaneous substation currents. The technical and economic review was based on previous experience with transit systems and specifically the NYCTA system and in system economics and rates. Environmental effects were determined by reviewing reports on battery storage. The computer simulation was based on new schedule data from NYCTA and on data previously obtained from NYCTA.

32004 (DOE/ET/25411—T2) Technical and economic analysis of a Rapid-Transit Battery-Storage Substation Project. Final report. Prouty, T.P. (AiResearch Mfg. Co., Torrance, CA (USA)). 13 Apr 1983. Contract AC02-79ET25411. 150p. NTIS, PC A07/MF A01. Order Number DE83012010.

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This final report evaluates the technical and economic viability of deploying battery storage in New York City subway traction substations. Rapid transit systems, which experience daily peak periods of travel, accommodate the demands by operating numerous multicar trains at closely spaced intervals. This activity results in two daily peaks in the demand for electric power that the transit system imposes upon the supplying electric utility. Reductions in the magnitude of this peak electric power required from the supplying utility can be accomplished by the storage of electric energy on the transit system side of the electric utility/transit interface. To be viable economically the dollar worth of the demand reduction must be sufficiently large to offset the battery storage system initial capital outlay and recurring operating and maintenance costs. The method used to evaluate the merit of deploying battery storage in the transit system was to establish a dollar value for the reduced demand, postulate a system to accomplish these savings, and subtract the life-cycle cost of this system from the savings on the basis of a net present value. This technique was implemented and the results evaluated for different amounts of battery deployment. Battery storage was found to be both technically feasible and economically attractive. It was concluded that the results of the study warranted construction of the pilot plant described in detail in the report.

32005 (DOE/NASA—0064-1) Lightweight electronically commutated dc motor for electric passenger vehicles. Echolds, E.F.; Walia, P.S. (AiResearch Mfg. Co., Torrance, CA (USA)). Sep 1982. Contract AI01-77CS51044. 95p. (NASA-CR—165601). NTIS, PC A05/MF A01. Order Number DE83010795.

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A program was conducted to develop a state-of-the-art, electronically commutated motor specifically designed for propulsion of electric vehicles with increased range, reduced energy consumption, and reduced life-cycle costs compared with conventional systems. The program was accomplished in two phases involving development and test of (1) a functional model breadboard converter and a rare-earth-cobalt, permanent-magnet (PM) motor, and (2) an engineering model converter and PM motor suitable for vehicle installations. The converter and motor achieved an 88 percent peak efficiency, a maximum output of 26 kW at 26,000 rpm, and a continuous rating of 15 kW. The system also regenerated power to the source during braking, with a demonstrated peak power available at the converter terminals of approximately 26 kW at 88 percent efficiency. Major conclusions included: (1) the SAE J227a(D) driving cycle efficiency for the converter/motor is 86 to 88 percent when energy available for recovery at the converter terminals is included; (2) the converter initial cost is approximately five time that of the permanent magnet motor, but can be reduced by means of LSI logic and integrated liquid-cooled semiconductor packages; and (3) an electronically commutated motor with a liquid-cooded converter will operate reliably without service or maintenance for the life of a passenger vehicle.

32006 (DOE/NASA/51044—29) Tests of an alternating-current propulsion subsystem for electric vehicles on a road load simulator. Stenger, F.J. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Dec 1982. Contract AI01-77CS51044. 41p. (NASA-TM—83036). NTIS, PC A03/MF A01. Order Number DE83010986.

This report presents the test results of a breadboard version of an ac electric-vehicle propulsion subsystem designed and built by Eaton Corporation under a cost-shared contract to NASA Lewis Research Center as a part of the US Department of Energy (DOE) Electric and Hybrid Vehicle Program. The breadboard was installed in the NASA Lewis Research Center Road Load Simulator facility and tested under steady-state and transient conditions. Steady-state tests were run to characterize the system and compo-

nent efficiencies over the complete speed-torque range within the capability of the propulsion subsystem in the motoring mode of operation. Transient tests were performed to determine the energy consumption of the breadboard over the acceleration and cruise portions of SAE J227a driving schedules B, C, and D. Tests in the regenerative mode were limited to the low-gear-speed range of the two-speed transaxle used in the subsystem. The maximum steady-state subsystem efficiency observed for the breadboard was 81.5% in the high-gear-speed range in the motoring mode, and 76% in the regenerative braking mode (low gear). The subsystem energy efficiency during the transient tests ranged from 49.2% for Schedule B to 68.4% for Schedule D.

32007 **(NP—3901175) Experimental studies on the driving dynamics of mine locomotives driven by accumulator batteries.** Szymanski, J. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen). 13 Dec 1979. 187p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83901175.

Portions are illegible in microfiche products; Thesis.

The author discusses the economics of mine transport using conventional, step-controlled locomotives and thyristor-controlled locomotives. The costs are calculated at the cost level of 31. Dec. 1970. Characteristics of master-controlled and thyristor-controlled 24.4 kW locomotives have been recorded at the locomotive test bench of the Institute for Mining and Metallurgical Machinery of the RWTH Aachen; the two types of locomotive can be coupled and used as double locomotive. These characteristics, as well as the running resistance of a medium- and a large-volume tab measured for various running angles on the same test bench, have been used as a basis for the studies. On the basis of these data, hauls between the shaft and the loading point of a mine have been calculated.

3304 Hybrid Systems

32008 **(DOE/NASA/0093—1) Advanced hybrid vehicle propulsion system study.** Schwarz, R. (South Coast Technology, Inc., Ann Arbor, MI (USA)). May 1982. Contract AI01-77CS51044. 329p. (NASA-CR—159773). NTIS, PC A15/MF A01. Order Number DE83011420.

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Results of a study of an advanced heat engine/electric automotive hybrid propulsion system are presented. The system uses a rotary stratified charge engine and an ac motor/controller in a parallel hybrid configuration. The three tasks of the study were (1) parametric studies involving five different vehicle types, (2) design trade-off studies to determine the influence of various vehicle and propulsion system parameters on system performance fuel economy and cost, and (3) a conceptual design establishing feasibility at the selected approach. Energy consumption for the selected system was .034 l/km (61.3 mpg) for the heat engine and .221 kWh/km (.356 kWh/mi) for the electric power system over a modified J227a schedule D driving cycle. Life cycle costs were 7.13 cents/km (11.5 cents/mi) at $2/gal gasoline and 7 cents/kWh electricity for 160,000 km (100,000 mi) life.

3306 Vehicle Design Factors

REFER ALSO TO CITATION(S) 31348

3307 Emission Control

REFER ALSO TO CITATION(S) 31999

3308 Alternative Fuels

REFER ALSO TO CITATION(S) 31076, 31215

36 MATERIALS

3601 Metals And Alloys

REFER ALSO TO CITATION(S) 31247, 31261, 31275, 31366, 31647, 31653, 31653, 31659, 31660, 31660, 31661, 31678, 31678, 31679, 31799, 31829, 32177, 32242, 32773

32009 **(AD-A—123462/4) Ion-beam deposited films for refractory-metal tunnel junctions.** Ruggiero, S.T.; Face, D.W.; Prober, D.E. (Yale Univ., New Haven, CT (USA)). 1982. 4p. NTIS, PC A02/MF A01.

In this paper we report on the ion-beam deposition of Nb and Ta films. The deposition of refractory metal films is of considerable interest because of their desirable superconducting and material properties. In particular, Nb has the highest Tc of the elemental superconductors and is favored for superconducting device applications because of its physical integrity. However, it is well known that pure Nb tunnel junctions characteristically exhibit non-ideal behavior which has been attributed to suboxide growth at the Nb/Nb2O5 interface. A very promising approach to ameliorating this situation is to cover the surface of the Nb film, in situ, with a thin overlayer of another metal which can 'cap' the Nb surface and form an improved tunneling oxide.

32010 **(AD-A—123463/2) Ion-beam deposition of Nb and Ta refractory superconducting films.** Face, D.W.; Ruggiero, S.T.; Prober, D.E. (Yale Univ., New Haven, CT (USA)). 1982. 15p. NTIS, PC A02/MF A01.

In this paper we report on the electrical, superconducting, and structural properties of ion-beam deposited Nb and Ta films produced using a Kaufman ion source. We find that after careful optimization of ion gun parameters and the use of Xe gas, this technique is capable of reproducibly depositing high quality superconducting Nb films on room temperature substrates. The deposition conditions are, in fact, less stringent than for e-beam or planar sputtering systems. We also find that by employing a multiple target capability, high quality Ta films can be produced under the same conditions by first depositing a thin underlayer of Nb.

32011 **(AERE-R—10038) Positron annihilation studies of nickel and steel electrolytically charged with hydrogen.** Smith, F.A.; Hughes, A.E.; Coleman, C.F. (UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.). Feb 1981. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700899.

Samples of polycrystalline nickel, 1 1/2 Ni-Cr-Mo steel and '20 carbon' steel have been studied by the positron annihilation Doppler technique after charging with hydrogen at a current density of 0.1 A cm^{-2}. This work has been carried out to check reports from the USA that positron annihilation could be used to determine the extent of hydrogen embrittlement in metals. The 511 keV annihilation gamma ray line narrows a little when heavily deformed nickel is charged, but no significant changes have been observed in annealed nickel or in the two steels. The technique does not look viable for non-destructive testing of embrittled materials, but the results in nickel do show that the state of deformation of the sample has a marked influence on further microstructural changes produced by the charging process.

32012 **(CONF-810728—11) In-situ Rutherford backscattering analysis of radiation-induced segregation.** Averback, R.S.; Rehn, L.E.; Wagner, W.; Okamoto, P.R.; Wiedersich, H. (Argonne National Lab., IL (USA)). Jun 1981. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83010597.

From 9. international conference on atomic collisions in solids; Lyon, France (6 Jul 1981).

Composition changes were measured near the irradiated surfaces of binary Ni-based alloys during He and Kr irradiations using high-resolution Rutherford Backscattering Spectrometry (RBS). For the He irradiation, backscattered ions from the beam that was employed for the production of defects were used for simultaneous RBS analysis of the near-surface composition. These in-situ meas-

urements of composition changes during irradiation at elevated temperature provide quantitative information on the kinetics of RIS. This paper demonstrates the use of the in-situ RBS technique to measure RIS in different alloys and show examples of the type of kinetic information that can be obtained. The versatility of the technique is demonstrated by presenting results on alloys for which the solute atomic mass is greater than (Ni-Ge), less than (Ni-Si), and nearly the same as (Cu-Ni) that of the host atoms. RIS results obtained for Kr and He irradiations of Ni-Si are also compared to illustrate the effect of the different primary recoil spectra on the kinetics of RIS.

32013 **(CONF-820950—9) Magnetism in the actinides: the role of neutron scattering.** Lander, G.H. (Argonne National Lab., IL (USA); Institut Max von Laue - Paul Langevin, 38 - Grenoble (France)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83008944.

From Conference on the neutron and its applications; Cambridge, UK (13 Sep 1982).

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Neutron scattering has played a crucial and unique role of elucidating the magnetism in actinide compounds. Examples are given of elastic scattering to determine magnetic structures, measure spatial correlations in the critical regime, and magnetic form factors, and of inelastic scattering to measure the (often elusive) spin excitations. Some future directions will be discussed.

32014 **(CONF-821049—21) Molecular-dynamics simulation of low energy displacement cascades in Cu.** King, W.E.; Benedek, R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 31p. NTIS, PC A03/MF A01. Order Number DE83010702.

From TMS/AIME fall meeting(Radiation damage analysis for fusion reactors); St. Louis, MO, USA (24 Oct 1982).

Portions are illegible in microfiche products.

Molecular-dynamics computer simulations have been performed to study properties of low-energy (< 500 eV) displacement cascades in Cu. Various aspects of the time development of cascades are considered including instantaneous number of Frenkel pairs, partitioning of kinetic and potential energies, distribution of atom kinetic energies, cascade expansion rate, and Frenkel-pair distributions. The anisotropy of the threshold energy for Frenkel-pair production is interpreted in terms of branching. Replacement sequences and the damage function are discussed based on analysis of events corresponding to 18 recoil directions. The damage function exhibits a plateau at nu $\sim$ 0.5 Frenkel pairs extending from 25 to 150 eV; at higher recoil energies the onset of multiple defect production is much slower than predicted by the modified Kinchin-Pease model.

32015 **(DESY-SR—82-09) Surface binding energy shifts for sodium, magnesium and aluminium metals.** Kammerer, R.; Barth, J.; Gerken, F.; Kunz, C.; Floestrom, S.A.; Johansson, L.I. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jun 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750042.

The core level binding energy shifts for surface atoms relative to bulk atoms ('surface shifts') have been measured for the 2p levels of Na (220 meV) and Mg (140 meV) using synchrotron radiation excited photoelectron spectroscopy. For Al, both a surface shift and a broadening are considered. The sign and magnitude of these shifts are compared with calculated values based on surface energies. The mean free path of the photoelectrons is determined by evaluation of the intensity ratio Isub(Bulk)(2p)/Isub(Surface)(2p).

32016 **(DOE/ER/02206—10) Nucleation and growth of defects in heavy-ion and electron-bombarded metals. Final report for the period ending February 29, 1980.** Kulcinski, G.L. (Wisconsin Univ., Madison (USA)). Apr 1983. Contract AC02-76ER02206. 7p. NTIS, PC A02/MF A01. Order Number DE83011493.

He preinjection was found to be essential in nucleating voids in high-purity Al. Interstitial pickup in high-purity V was found to be important even under good vacuum (10^{-6} to 10^{-7} torr). Voids were found to form in V down to 200°C. A model was tested against rdiation disordering/ordering in Cu_3Au. Disordering in CuPd was studied. A small negative heavy ion source (SNICS) was developed for the tandem accelerator. (DLC)

32017 **(DOE/ER/04496—1) Surface characterization of catalytically active metal, alloy, and compound films. Final report, September 1, 1977-April 30, 1983.** Vook, R. (Syracuse Univ., NY (USA)). 30 Apr 1983. Contract AC02-77ER04496. 15p. NTIS, PC A02/MF A01. Order Number DE83011605.

There were two major achievements of this research project. The first was the discovery of the Auger electron spectroscopy R-factor method for characterizing epitaxial layer-by-layer thin film growth. It is a method that gives information on the surface topography of thick as well as thin films and was used to identify the occurrence of extremely flat crystal faces. The second major achievement occurred when it was found that extremely flat (111) Pd surfaces were almost entirely inert with respect to the adsorption of oxygen and carbon monoxide, even at very high doses. Such Pd surfaces could be made reactive by roughening them (i.e. by forming a thinner film), or by contaminating them. Indeed very large amounts of 0 and CO could be adsorbed if there were small amounts of Cl on the surface. Furthermore, polycrystalline thin films of Pd also adsorbed large amounts of 0 and CO. The principal techniques used in these studies were AEC, LEED, RHEED, EELS and TEM. The importance of these results lies in the fact that it has been established that smooth, flat surfaces of Pd are almost inert with respect to 0 and CO adsorption. Thus future studies involving modification of these surfaces should be most informative in illuminating the nature of catalytically active sites.

32018 **(DOE/ER/10430—2) Hydrogen absorption in metals: a field-ion microscopy study. Technical progress report, June 1, 1981-June 30, 1983.** (Pennsylvania State Univ., University Park (USA)). 1983. Contract AC02-79ER10430. 26p. NTIS, PC A03/MF A01. Order Number DE83011370.

For the last two and one half years, progress has been made in several areas in addition to the completion of the atom-probe construction: (1) compositional analysis of Ti clusters and H associated microcrack formation in Fe-Ti alloys, (2) grain boundary segregation of phosphorus in Fe-P alloys, (3) surface segregation in Ni-Cu alloys, (4) surface segregation and order-disorder in Ni-Cr alloys, and (5) development of a new method of introducing a grain boundary in-situ within a view of a FI image by controlled laser irradiation.

32019 **(DOE/ER/12061—1) High-pressure electron-resonance studies of electronic, magnetic, and structural phase transitions. Progress report.** Pifer, J.H.; Croft, M.C. (Rutgers--the State Univ., New Brunswick, NJ (USA). Dept. of Physics). 15 Jan 1983. Contract AS05-82ER12061. 15p. NTIS, PC A02/MF A01. Order Number DE83011590.

Research is described in development of a high-pressure electron-resonance probe capable of operating down to 1.5°K temperatures. The apparatus has been used to measure the EPR of a sample of DPPH at room temperature and zero pressure. EPR has been used to measure valence field instabilities in alloy systems. Studies have been done on metal-insulator transitions at high pressure, and are briefly described.

32020 **(IC—81/30) Electric resistivity and structure of liquid alkali metals and alloys as electron-ion plasmas.** Pastore, G.; Senatore, G.; Tosi, M.P. (International Centre for Theoretical Physics, Trieste (Italy)). Mar 1981. 22p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700901.

Calculations of the dependence of the electric resistivity in liquid alkali metals and alloys on temperature, density and composition are reported as a test of a simple structural model which describes these systems as electron-ion plasmas, within the framework of linear screening theory for the electron-ion coupling. The model also suggests an approximate correlation between the isothermal composition dependence of the principal peak in the X-ray diffrac-

tion pattern of the alloy and its phase diagram, which is partly borne out by the available data for the systems Na-K and Na-Cs.

32021 **(INIS-mf—7512) Valence instabilities in cerium intermetallics.** Dijkman, W.H. (Amsterdam Univ. (Netherlands)). 21 Apr 1982. 220p. NTIS (US Sales Only), PC A10/MF A01. Order Number DE83780439.

Thesis.

The primary purpose of this investigation was to study the magnetic behaviour of cerium in intermetallic compounds that show an IV behaviour, e.g. $CeSn_3$. In the progress of the investigations, it became of interest to study the effect of changes in the lattice of the IV compound by substituting La or Y for Ce, thus constituting the Cesub(1-x)Lasub(x)Sn_3 and Cesub(1-x)Ysub(x)Sn_3 quasibinary systems. A second purpose was to examine the possibility of introducing instabilities in the valency of a trivalent intermetallic cerium compound: $CeIn_3$, also by La and Y-substitutions in the lattice. Measurements on the resulting Cesub(1-x)Lasub(x)In_3 and Cesub(1-x)Ysub(x)In_3 quasibinaries are described. A third purpose was to study the (gradual) transition from a trivalent cerium compound into an IV cerium compound. This was done by examining the magnetic properties of the CeInsub(x)Snsub(3-x) and CePbsub(x)Snsub(3-x) systems. Finally a new possibility was investigated: that of the occurrence of IV behaviour in $CeSi_2$, CeSi, and in $CeGa_2$.

32022 **(INIS-mf—7557) Experimental analysis of nonlinear problems in solid mechanics.** (Gesamthochschule Wuppertal (Germany, F.R.)). 1982. 22 p.p. (CONF-820990—Absts.). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83780440.

From 152. EUROMECH colloquium - experimental ayalysis of nonlinear problems in solid mechanics; Wuppertal, F.R. Germany (21 Sep 1982).

The booklet presents abstracts of papers from the Euromech Colloqium No. 152 held from Sept. 20th to 24th, 1982 in Wuppertal, Federal Republic of Germany. All the papers are dealing with Experimental Analysis of Nonlinear Problems in Solid Mechanics. (RW).

32023 (INIS-mf—7557, pp vp) **Experimental modelling of anisotropic continuum damage evolution.** Litewka, A.; Sawczuk, A. 1982. NTIS (US Sales Only), PC A02/MF A01. (CONF-820990—Absts.).

From 152. EUROMECH colloquium - experimental ayalysis of nonlinear problems in solid mechanics; Wuppertal, F.R. Germany (21 Sep 1982).

32024 (INIS-mf—7557, pp vp) **Observed non linear effects and their description by a hereditary constitutive law.** Elleuch, M.N.; Favier, D.; Guelin, P.; Wack, B. 1982. NTIS (US Sales Only), PC A02/MF A01. (CONF-820990—Absts.).

From 152. EUROMECH colloquium - experimental ayalysis of nonlinear problems in solid mechanics; Wuppertal, F.R. Germany (21 Sep 1982).

32025 (INIS-mf—7557, pp vp) **Some experimental problems in non linear fracture mechanics.** Ohlson, N.G. (Kungliga Tekniska Hoegskolan, Stockholm (Sweden)). 1982. NTIS (US Sales Only), PC A02/MF A01. (CONF-820990—Absts.).

From 152. EUROMECH colloquium - experimental ayalysis of nonlinear problems in solid mechanics; Wuppertal, F.R. Germany (21 Sep 1982).

32026 **(Juel—1771) Approach to a phenomenological description of hydrogen and tritium permeation through steels, and the action of oxide scales to reduce permeation.** Hecker, R.; Stoever, D.; Buchkremer, H.P. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung). Feb 1982. 44p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750020.

Experiments are presented investigating the action of corrosion scales on several steels against hydrogen and tritium permeation. We are interested in such model experiments to learn how to prevent tritium permeation from the primary circuit of an HTR to the secondary side. The same problem might be of some importance in later fusion reactor technology. Our corrosion scales were formed in a temperature range between 500°C and 950°C under varying steam hydrogen mixtures. Thickness of the scales was up to several μm. By adequate choice of the 'process' parameters we succeeded to produce oxid scales with relativ high reduction factors for hydrogen permeation as compared with the permeation through the blank metal surfaces. Such scales also show a linear correlation between hydrogen pressure and permeation and an increased activation energy for permeation as compared to that of the blank metal. Our observations cast doubt on elder theories trying to explain the action of oxide films. We try here to apply a formalism presented first by Ash and Barrer to describe our findings. According to our experiments we believe that oxide scales formed under the conditions prevailing here act rather as a 'dissociationbarrier' than as a 'diffusionbarrier'.

32027 **(Juel—1781) Growth of helium bubbles in AISI 316 austenitic stainless steel.** Rothaut, J. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung; Technische Hochschule Aachen (Germany, F.R.)). Apr 1982. 65p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750030.

Thesis.

Foil specimens of solution annealed AISI 316 austenitic stainless steel were homogeniously helium implanted at room temperature. Subsequently the influence of helium concentration, external stress, annealing time and temperature on the growth of helium bubbles in the matrix was analysed by quantitative TEM investigation. Besides, results of creep tests and qualitative investigations of helium bubbles on grain boundaries were pointed out. The observed time and helium concentration dependence of the mean bubble radius was in good agreement with bubble growth by an Ostwald ripening mechanism. The activation energie of helium permeation of 3.6 eV is also in good accordance with theoretical values and rules out bubble growth by migration and coalescence. After annealing under stresses in the range of 85 MPa a bimodal bubble size distribution was observed while under lower stresses and unstressed conditions the usual monomodal distribution was found. A possible explanation of this observation is a two stage nucleation process.

32028 **(KFK—3106) Inherited textures in the bcc phase furnish information about the type of transformation from the fcc phase.** Jung, V. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Zyklotronlaboratorium). Jul 1982. 18p. (In German). (CONF-820374—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750038.

From 46. meeting of physicists; Muenster, F.R. Germany (29 Mar 1982).

Drawing annealed cylindric 18/8 Cr Ni steels, which are originally free of textures, produces the transformed phases - hcp and bcc - both showing major texture contributions with increasing stretching of the cylindric specimens. After stretching the original fcc-phase shows two orientations: [100]fcc vertical stroke vertical stroke cylinder axis and [111]fcc vertical stroke vertical stroke cylinder axis, i.e. direction of stress. In both cases the martensitic phase is produced by gliding and shear in the sequence fcc → hcp → bcc by Nishiyama-Wasserman (N-W) or Kurdjumov-Sachs (K-S) transformation in the (111)fcc planes, which enclose a small angle with direction of stress, i.e. cylinder axis. The calculated orientation distributions of the (110)bcc reflex are compared with the distribution measured by neutron diffraction to get information on the bulk material. The special K-S transformation with only 6 (110)bcc orientations shows relatively good agreement with the measured distribution, except at small angles ω between the cylinder axis and the scattering vector. This might be caused by the isotropic fraction of the fcc phase producing an anisotropic (110)bcc orientation distribution.

32029 **(KFK-PFT—10) Pole reversal in acid Cu baths.** Sander, H.; Bolch, T. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekttraegerschaft Fertigungstechnik). Jun 1982. 69p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750033.

Documentation on 'Pole reversal in acid Cu baths' with the objective to reduce the exposure time in baths and to accelerate the processing respectively manufacturing time of galvano-electrodes with present quality requirementshaving to be met for galvano-electrodes which are used for the construction of large dies and tools and large moduls for sheet metal and plastics processing.

32030 (KFTI—81-7, pp 79-81) **Autoion microscopy of defects in tungsten subjected to electrospark treatment.** Sharov, B.V.; Bobkov, A.F.; Zajtsev, S.V.; Suvorov, A.L. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Autoionic microscopic analysis of structural defects in tungsten subject to electric spark treatment has been performed. Generation of single point defects and their complexes of low parity, pores with linear dimensions of 10-50 A, depleted zones, dislocations with anti b=a/a/2(111) and anti b=a(100) as well as dislocation loops of the interstitial type of almost 30 A diameter has been discovered. Qualitative coincidence of a revealed range of defects with the defect spectrum in irradiated materials points to possibility for using electric spark treatment as one of the effective methods of simulation of radiation effect.

32031 (KFTI—81-7, pp 3-8) **Some observations on nucleation and growth of voids and dislocation loops in low dose neutron irradiated copper.** Singh, B.N.; Leffers, T. (Risoe National Lab., Roskilde (Denmark)). 1981. NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

The irradiation induced structure of voids and dislocation loops with special attention on low neutron doses has been studied. High-purity copper specimens were irradiated in the DR-3 reactor at Ris to doses of $1x10^{22}$ and $5x10^{22}$ neutrons (fast)/m^2 at 250 deg C. After irradiation the specimens were examined by means of a transmission electron microscope. The observations have demonstrated that at low doses and low dose rates the void and dislocation populations are highly segregated: the dislocation loops and segments were present in the form of irregular wall and the voids were found to be distributed between these walls. The swelling rate in the low dose experiments was very high. These observations can not be understood within the existing theoretical framework.

32032 (KFTI—81-7, pp 28-30) **Spatial distribution profile calculation of vacancy clusters in metals, irradiated by the accelerated ion beam.** Kirsanov, V.V. (AN Kazakhskoj SSR, Alma-Ata. Inst. Yadernoj Fiziki); Gann, V.V.; Yudin, O.V. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

A technique which permits calculation of spatial distribution of not only simple defects but vacancy clusters as well as energy losses for their formation in the case of metal irradiation with heavy ions is suggested. Dependence of the cluster diameter on PKA (primary knocked out atoms) energy is evaluated. Besides a method for determining this dependence in experiment is suggested. Possibility for consideration of the spatial distribution of the vacancy clusters will permit better understanding of processes leading to swelling, radiation creep and other changes in irradiated material properties.

32033 (KFTI—81-7, pp 33-38) **Swelling studies of the deformed low chromium-base alloy under irradiation in the accelerator.** Bryk, V.V.; Voevodin, V.N.; Zelenskij, V.F.; Matvienko, B.V.; Neklyudov, I.M.; Khorenko, V.K.; Chernyaeva, T.P. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.); Rakitskij, A.N.; Trefilov, V.I. (AN Ukrainskoj SSR, Kiev. Inst. Problem Materialovedeniya). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Results of investigation into a chromium base alloy on irradiated with 3 MeV Cr^{3+} ions in the temperature range of 550- 700 deg C to a dose of 0 at are given. Dependences of radiation swelling of the alloy on the irradiation temperature and dose are presented. Noted are characteristic peculiarities of the alloy swelling process: small duration of swelling incubation and relatively low swelling rate at a steady stage; shift of temperature range of swelling to lower temperatures as compared to FCC metals; homogeneity of voids distribution density with respect to inner regions of dislocation, cells, dislocation clusters and grain boundaries; tendency to ordering of distribution over volume. Comparison of the data obtained with the results in literature for other BCC metals points to community of regularity of radiation porosity development in them under irradiation.

32034 (KFTI—81-7, pp 39-41) **Statistical distribution of length of focused replacement collision sequences of atoms in tungsten.** Suvorov, A.L. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

A technique has been developed and calculation (by means of an electronic computer) of distributing chains of focussed substituting atoms in length lsub(fc) in specimens of pure tungsten with thorium additives irradiated with deuterons, neutrons and fission fragments has been performed. Results of early field-ion microscopic analysis of the irradiated specimen structure - a series of field ion images obtained in the process of succesive evaporation with the tungsten field were used as initial data; lsub(fc) mean values corresponding to approximately 330 K irradiation temperature and two crystallographic directions (110) and (111) have been determined.

32035 (KFTI—81-7, pp 46-48) **Low-temperature stages of annealing radiation defects in titanium affects by ultrasonic oscillations.** Naskidashvili, I.A.; Naskidashvili, A.I.; Lapiashvili, Eh.S.; Martkoplishvili, G.S.; Asatiani, M.T.; Topchyan, L.S. (AN Gruzinskoj SSR, Tbilisi. Inst. Fiziki). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Annealing spectra of point defects in titanium subject to ultrasonic (US) oscillations and low-temperature (50 K, 120 K) neutron irradiation with approximately $2x10^{18}$ neutr. cm^{-2} (E>=0.5 MeV) fluence have been investigated. The investigations were carried on with a calorimetric method of stored energy measurement. It is discovered that at the second stage of recovery there is a decomposition at least, of three different mixed complexes of the "interstitial atom- impurity atom" type and that previous US effect of titanium results in considerable deformation of annealing spectra of radiation defects of the second recovery stage up to disappearance of one of its substages as compared with previously annealed and irradiated after that titanium. It is concluded that defects generated during the irradiation pin dislocations appearing in consequence of the US effect and thus result in breaking-up their segments significantly strengthening the metal, activation energy of migration of interstitial titanium atoms and a threshold amplitude of dislocation break.

32036 (KFTI—81-7, pp 55-57) **Internal reflection of interstitial atoms from close-packed tungsten faces.** Dranova, Zh.I.; Mikhajlovskij, I.M. 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Use of field-ion microscopy methods has shown that changes in microtopography of tungsten specimens irradiated with 2-5 keV helium atoms are mainly related to the liberation of interstitial atoms on the surface. It is established that the atom liberation on the surface is considerably anisotropic: maximum quantity of atoms is observed in the vicinity of faces (100), (111) and (211) along the sections of zone lines (110) oriented along the edge of the first Brillouin zone. The atom liberation on plane sections of the most dense-packed face (110) was not observed as a rule; atomic steps of the face are interstitial atom sinks. It is concluded on the basis of the results obtained that there is the predominant inner reflection of interstitial atoms from the dense-packed faces and a possible contri-

bution of inner reflection to the surface migration processes activated with the ion bombardment as well as material swelling have been analyzed.

32037 (KFTI—81-7, pp 70-74) **Swelling of nickel and nickel-silicon oxide compositions under ion irradiation.** Bendikov, V.I.; Guglya, A.G.; Gusev, V.A.; Matvienko, B.V.; Il'inskij, A.I.; Neklyudov, I.M.; Savchenko, I.A.; Bredikhin, M.Yu.; Il'enko, B.P. 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Comparative study of radiation swelling of nickel and Ni-SiO compound (near 0.5 wt %) on irradiation of thin vacuum condensates of the above materials with nickel and argon ions at 500-625 deg C has been performed. It is shown that the introduction of dispersed particles of silicon oxide into nickel results in the marked suppression (3-4 times) of vacancy swelling in the investigated temperature range. In the case of development of vacancy and gas porosity (irradiation with argon ions), the positive effect of SiO particles on the swelling decreases monotonously with the growth of irradiation temperature.

32038 (LBF-FB—162) **Model for predicting non-linear crack growth considering load sequence effects (LOSEQ).** Fuehring, H. (Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Darmstadt (Germany, F.R.). Inst. fuer Betriebsfestigkeit). 1982. 101p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750025.

A new analytical model for predicting non-linear crack growth is presented which takes into account the retardation as well as the acceleration effects due to irregular loading. It considers not only the maximum peak of a load sequence to effect crack growth but also all other loads of the history according to a generalised memory criterion. Comparisons between crack growth predicted by using the LOSEQ-programme and experimentally observed data are presented.

32039 (LBF-FB—163) **Effect of throat-thickness, plate-thickness and welding procedure on the fatigue strength of high-strength steels.** Greif, M.; Olivier, R. (Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Darmstadt (Germany, F.R.). Inst. fuer Betriebsfestigkeit). 1982. 108p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750015.

The effect of throat- and plate-thickness, welding procedure and post weld heat treatment on the fatigue strength of angular fillet welds in 6 structural and high strength steels is investigated. The statistically designed factorial includes constant amplitude tests under alternating or zero-to-tension loading on manual or submerged arc welded specimens in 50 and 20 mm plate-thickness. At an identical ratio of throat-thickness to plate-thickness, the fatigue strength of 20 mm thick specimens is about a factor of 1,3/1 higher than that of 50 mm thick specimens. This increase is verified by hot spot strain-measurements at the fatigue-critical weld toe. Plate-material and welding-procedure are parameters of minor importance. Stress relieving leads to an increase of fatigue strength depending on plate-thickness and stress-ratio. The supportable stress amplitude is higher under alternating than under zero-to-tension loading.

32040 (LBF-FB—164) **Comparison of fatigue test results for different loading sequences with aid of the Relative-Miner-Rule.** Buch, A.; Lowak, H.; Schuetz, D. (Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Darmstadt (Germany, F.R.). Inst. fuer Betriebsfestigkeit). 1982. 72p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750016.

The Relative-Miner-Rule was applied for comparison of test results obtained in different laboratories with not fully identical loading spectra on notched specimens, pin-lug joints and riveted joints. It was shown, that the Relative-Miner-Rule takes into account the effect of the loading spectrum modification in the case when the corresponding loading frequency distributions have nearly identical maximal loading distributions. The Relative-Miner-Rule results in this case in better life predictions than the conventional Miner-Rule. A conversion with aid of the Relative-Miner-Rule of test results for joints in comparable fatigue life parameters (e.g. number of flights) for a common loading frequency distribution is possible if the S-N lines of the joints are experimentally established.

32041 (MINTEK-M—66) **Review of corrosion inhibitors: theory and practice.** White, R.T. (Council for Mineral Technology, Randburg (South Africa)). 3 Jan 1983. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901911.

The chemical water treatments available to the mining industry are diverse in composition, action, and efficiency. This review ilustrates the mechanisms and uses of inhibitors for the prevention of corrosion over the whole range of aqueous systems. It should provide an understanding of the problems associated with the choice of inhibitors for use in plants.

32042 (NIIAR—32(485)) **Mechanical and corrosion behaviour of zirconium alloys under irradiation.** Tsykanov, V.A.; Davydov, E.F.; Shamardin, V.K. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1981. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700310.

Presented are the results of corrosion snd short-term and long-term mechanical tests of the zirconium alloys: Zr + 1%Nb, Zr + 1%Nb + (0.13-0.16)%O_2, and Zr + 1%Nb + 1.3%Sn + 0.4%Fe. As to mechanical properties the tin-containing alloy is shown to have advantages under irradiation and test conditions close to those of real for the WWER-1000 reactor fuel pin cladding. Under neutron irradiation in water of high temperature and pressure corrosion properties of this alloy are quite satisfactory.

32043 (NUREG/CR—2482-Vol.2, pp 53p, Paper 2) **Uniform- and pitting-corrosion data requirements for TiCode-12 high-level-waste containers.** Shao, J.; Soo, P. Apr 1983. NTIS, PC A07/MF A01 - GPO $6.00. (BNL-NUREG—51494-Vol.2).

In Review of DOE waste-package program. Subtask 1.1. National waste-package program, September 1981-March 1982. Volume 2.

The uniform and pitting corrosion behavior of TiCode-12 in salt and basalt repository environments is addressed. The available corrosion data are presented and reviewed. It is concluded that insufficient data exist to fully characterize TiCode-12 corrosion behavior under repository conditions and to determine its capability to contribute to the NRC 1000-year containment criterion. The additional data needs and testing requirements are specified. They are, however, for a generic waste package and may be modified as detailed waste package designs are specified by DOE. A summary of the needed information is presented.

32044 (PB—83-149443) **Vanadium roast-leach dissolution from western phosphate tailings. Report of investigations/ 1982.** Russell, J.H.; Collins, D.G.; Rule, A.R. (Bureau of Mines, Albany, OR (USA). Albany Research Center). Oct 1982. 25p. NTIS, PC A02/MF A01.

As part of its efforts to maximize resource recovery, the Bureau of Mines conducted studies to recover valuable byproducts from Western phosphate beneficiation tailings. Potential byproducts include phosphorus, vanadium, and uranium. The objective was to determine roasting and leaching conditions for maximum dissolution of vanadium from tailings.

32045 (PB—83-161430) **In situ monitoring of electrochemical reactions by surface enhanced Raman scattering. Final report 1 Jul 80-31 Aug 82.** Chang, R.K. (Yale Univ., New Haven, CT (USA)). Nov 1982. 38p. NTIS, PC A03/MF A01.

Several aspects of the recently discovered surface enhanced Raman scattering (SERS) from molecules adsorbed on a metal-liquid or metal-gas interface were investigated. Since the physical origins of such a large enhancement factor 10,000 - 1,000,000 times on Ag surfaces) are not yet fully understood, the authors pursued the topic of SERS from the basic science aspect, concentrating mainly on the electromagnetic 'antenna' enhancement effect and on

the adatom-related resonance effect. They also pursued the topic of SERS from the applications aspect, concentrating mainly on the correlation between the SERS spectra of adsorbed molecular species and the electrochemical cyclic voltammograms. This ability to provide molecular specific information on ions and molecules adsorbed on noble metal (Ag, Au, and Cu) electrodes, immersed in various electrolytes and controlled by a potentiostat, has eventual relevance to the H_2/O_2 Pt-acid fuel cell system. In addition, they applied SERS to the monitoring of adsorbed molecules catalytically formed on Ag powder catalysts which had been briefly exposed to SO_2, O_2, O_3, NO, or NO_2 gas introduced into a purging He gas stream. Since SERS can detect catalytically formed SO_3^{-2}, SO_4^{-2}, NO_2^{-1} and NO_3^{-1} ions on Ag powder, they believe that SERS may one day be useful as an in situ diagnostic probe to provide molecular information on absorbed products/intermediates during actual catalytic reaction conditions. Whether SERS observed on the noble metals can be extended to transition metal surfaces (e.g., Pt, Pd, Ir, and Os), remains to be investigated.

32046 **(SAND—83-0299) Hardness correlation for uranium and its alloys.** Humphreys, D.L.; Romig, A.D. Jr. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 40p. NTIS, PC A03/MF A01. Order Number DE83011516.

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The hardness of 16 different uranium-titanium (U-Ti) alloys was measured on six (6) different hardness scales (R/sub A/, R/sub B/, R/sub C/, R/sub D/, Knoop, and Vickers). The alloys contained between 0.75 and 2.0 wt % Ti. All of the alloys were solutionized (850°C, 1 h) and ice-water quenched to produce a supersaturated martensitic phase. A range of hardnesses was obtained by aging the samples for various times and temperatures. The correlation of various hardness scales was shown to be virtually identical to the hardness-scale correlation for steels. For more-accurate conversion from one hardness scale to another, least-squares-curve fits were determined for the various hardness-scale correlations. 34 figures, 5 tables.

32047 **(SAND—83-0500) Permeability of hydrogen isotopes through nickel-based alloys.** Edge, E.M.; Mitchell, D.J. (Sandia National Labs., Albuquerque, NM (USA)). Apr 1983. Contract AC04-76DP00789. 21p. NTIS, PC A02/MF A01. Order Number DE83009672.

Permeabilities and diffusivities of deuterium in several nickel-based alloys were measured in this investigation. Measurements were made by the gas-phase breakthrough technique in the temperature range 200 to 450°C with applied pressures ranging from 1 to 100 kPa. The results were extrapolated to predict the permeabilities (K) of the alloys at room temperature. The alloy with the smallest deuterium permeability is Carpenter 49, for which $K = 4.3 \times 10^{-18}$ mol s^{-1} m^{-1} Pa^{-}/sup 1/2/ at 22°C. The permeability of deuterium in Kovar or Ceramvar is about 80% greater than that for Carpenter 49. Premeabilities of Inconel 625, Inconel 718, Inconel 750 and Monel K-500 are all equal to about 5×10^{-17} mol m^{-1} s^{-1} Pa^{-}/sup 1/2/ at 22°C. The validity (from a statistical standpoint) of the extrapolation of the permeabilities to room temperature is considered in detail. Published permeabilities of stainless steels and nickel-iron alloys are also reviewed. The greatest differences in permeabilities among the nickel-based alloys appear to be associated with the tendency for some alloys to form protective oxide layers. Permeabilities of deuterium through laminates containing copper are smaller than for any of the iron-nickel alloys.

32048 **(SLAC-TN—83-7) Fabrication of tungsten wire needles.** Roder, A. (Stanford Linear Accelerator Center, CA (USA)). Feb 1983. Contract AC03-76SF00515. 3p. NTIS, PC A02/MF A01. Order Number DE83012025.

Fine point needles for field emissoin are conventionally produced by electrolytically or chemically etching tungsten wire. Points formed in this manner have a typical tip radius of about 0.5 microns and a cone angle of some 30 degrees. The construction of needle matrix detector chambers has created a need for tungsten needles whose specifications are: 20 mil tungsten wire, 1.5 inch total length, 3 mm-long taper (resulting in a cone angle of about 5 degrees), and 25 micron-radius point (similar to that found on sewing needles). In the process described here for producing such needles, tungsten wire, immersed in a NaOH solution and in the presence of an electrode, is connected first to an ac voltage and then to a dc supply, to form a taper and a point on the end of the wire immersed in the solution. The process parameters described here are for needles that will meet the above specifications. Possible variations will be discussed under each approprite heading.

32049 **(UCRL—15518) Evaluation of 2 1/4 Cr-1 Mo steel for liquid-lithium containment. III. Effect of velocity and lead content. Unabridged final report.** Wilkinson, B.D.; Edwards, G.R. (Colorado School of Mines, Golden (USA). Dept. of Metallurgial Engineering). Dec 1981. Contract W-7405-ENG-48. 120p. NTIS, PC A06/MF A01. Order Number DE83012120.

The intergranular penetration of specially heat treated 2-1/4 Cr-1 Mo steel by lead-lithium liquids containing 0, 17.6, and 53 w/o lead has been investigated at temperatures ranging from 300 to 600°C and for times to 1000 hours. Limited tests using a 99.3 w/o lead-lithium liquid were also conducted.

32050 **(UCRL—82797-Rev.1) Thermal-outgassing behavior of electrodeposited black chromium.** Beat, T.G.; Kelley, W.K. (Lawrence Livermore National Lab., CA (USA)). 24 Jan 1983. Contract W-7405-ENG-48. 13p. (CONF-830608—1-Rev.1). NTIS, PC A02/MF A01. Order Number DE83006409.

From 70. annual technical conference on the American Electroplaters' Society; Indianapolis, IN, USA (26 Jun 1983).

The outgassing characteristics of electrodeposited black chromium were determined because of interest in using this coating in vacuum applications. Data obtained for a variety of conditions led to the conclusion that this coating is acceptable for use in optical-transport networks and plasma-physics experiments. The outgassing rate for an unbaked coating was 3×10^{-10} Torr liters/sec/cm^2.

32051 **(Y/DU—274) Uranium reactions with water vapor. Final progress report.** Condon, J.B.; Cristy, S.S.; Kirkpatrick, J.R. (Oak Ridge Y-12 Plant, TN (USA)). 5 Apr 1983. Contract W-7405-ENG-26. 70p. NTIS, PC A04/MF A01. Order Number DE83010558.

The reaction kinetics and ion microprobe mass analyzer (IMMA) depth-profile data for water-oxygen-uranium reaction is explained in terms of the perfusive-precipitation model. This model is reviewed extensively enough to deal with this interacting, 3-element reaction system. The model, based on simultaneous diffusion and product precipitation, can be applied to several systems in a parameterless fashion. It is applied to the uranium-water reaction in the absence and presence of the oxygen inhibitor. The results of the calculations of the model are compared to the experimental rates and the IMMA depth profiles obtained when ^{18}O-labeled water is used. The predictions are excellent for the pressure dependence of the rates, the activation energies for both the oxygen-poisoned and oxygen-free reactions, the absolute rates for the oxygen-poisoned case, and the IMMA depth profiles. The prediction of the absolute rate for the oxygen-free case is only within a factor of five due to the approximations made for the thermodynamics of the product layer that fixes the oxygen activity. Comparison of the model to experimental data for other metal-oxidation systems such as iron, silicon, copper, zirconium with oxygen, and thorium with water, is also presented to lend credibility to the modeling technique.

32052 **Correlations for thermodynamic and kinetic properties of gas solutes in liquid metal solvents.** Heshmatpour, B.; Parlee, N.A.D.; Stevenson, D.A. (Stanford Univ., CA). *High Temperature Science;* **15**: No. 1, 55-67(Mar 1982).

An empirical relationship was developed correlating the maximum oxygen solubility to the saturation activity of oxygen in several liquid metals at 950°C. Correlations that relate diffusivity with solubility and diffusivity with viscosity were examined for eight different liquid metal-oxygen systems, and it was concluded that these correlations are not universally applicable. A survey of several systems established the following trends: the more reactive is the liquid metal solvent, the lower is the maximum oxygen solu-

bility and activity coefficient, and the higher is the oxygen solubility at a given oxygen activity in the liquid metal in question. However, the validity of these trends in other liquid metal-oxygen systems needs to be examined.

32053 **Thermodynamics of incongruently vaporizing tungsten diselenide.** Schiffman, R.A.; Franzen, H.F.; Ziegler, R.J. (Iowa State Univ., Ames). *High Temperature Science;* **15**: No. 1, 69-78(Mar 1982). Contract W-7405-ENG-82.

The incongruent vaporization of WSe_2 was investigated by a simultaneous weight-loss-mass-spectrometric Knudsen effusion technique in the temperature range 1290-1720 K. For the reaction $(1/2)WSe_2(s) \rightarrow (1/2)W(s) + Se(g)$, $\Delta H_{298}^{\circ} = 311 +/- 3$ kJ/mol.

32054 **Helium deposition profiles from self-shielded alpha sources.** Garner, F.A. (Hanford Engineering Development Lab., Richland, WA (USA)). *Radiation Effects;* **66**: No. 3-4, 211-216(1982).

The use of ^{238}Pu and ^{244}Cm alpha sources for helium deposition into thin foils leads to different concentration profiles than are obtained with ion accelerators. The major differences arise due to isotropic emission in the source as opposed to normal incidence beams, and also due to self-shielding within the source. Using a source-target sandwich technique for typical pre-thinned foil applications leads to deposition profiles which are completely uniform, and also yields a substantial saving in time, effort and money compared to other alpha implantation techniques.

32055 **Preparation of atomically clean surfaces of selected elements: a review.** Musket, R.G.; McLean, W.; Colmenares, C.A.; Makowiecki, D.M.; Siekhaus, W.J. (Lawrence Livermore National Lab., CA). *Applications of Surface Science;* No. 10, 143-207(1982). Contract W-7405-ENG-48.

Surface cleaning procedures for seventy four of the elements having vapor pressures below 1.3×10^{-7} Pa at room temperature have been reviewed and evaluated. The emphasis was on in-situ procedures used to produce a clean surface on a macroscopic bulk sample in an ultra-high vacuum environment. In this review an atomically clean surface was defined to be an annealed surface (except where noted) at ambient temperature with a total surface contamination level of less than a few percent of a monolayer. Wherever possible only cleaning methods documented by element-specific, surface-analytical techniques were reviewed and subsequently incorporated into the table of recommended procedures. For some elements a variety of procedures was deemed acceptable. Any differences in methods for polycrystalline and single-crystalline surfaces of the same element have been detailed. References to the reviewed literature are grouped by element.

32056 **Influence of strain aging on the strain-rate sensitivity of the flow stress.** Schwarz, R.B. (Argonne National Lab., IL). *Scripta Metallurgica;* **16**: 385-390(1982).

Previously published studies on the deformation kinetics of several fcc alloys, i.e. single crystals of Al-0.7% Mg, polycrystals of AlMg, Inconel 600, Inconel X750, NiCo, AuCu, and FeC, are cited, and two models are proposed to explain the reported observations. The calculations suggest that excess vacancies play an important role in the dynamic strain aging of the alloys and that an intermediate thermal annealing process should remove the vacancies. (BLM)

32057 **Grain boundary precipitation in aluminum alloys: effect of boundary structure.** Gronsky, R. (Lawrence Berkeley Laboratory, CA); Furrer, P. *Metallurgical Reviews;* **12A**: 121-127(Jan 1981). Contract W-7405-ENG-48.

A transmission electron microscope study of grain boundary precipitation in Al-Zn and Al-Zn-Mg alloys has been conducted with emphasis on the influence of localized boundary structure. Intrinsic grain boundary defects are found to have a significant effect on the precipitation sequence in that they assist the emerging precipitates in establishing a low energy habit plane relationship with at least one bordering grain. Under more extreme conditions of unavailable habits or unfavorable intrinsic structures, extrinsic defects dominate the precipitation reaction.

32058 **Three surface TEM observations of cold rolled 1100 aluminum.** Rohr, D.L.; Hecker, S.S. (Los Alamos National Lab., NM). pp 50-51 of 39th Annual Prococeedings Electron Microscopy Soceity of America. Bailey, G.W. (ed.). Atlanta, GA; Electron Microscopy Soc. Amer. (1981).

As part of an on-going study of 1100 Al at large plastic strains, we have examined cold-rolled samples from three orientations; through the sheet surface, and in the thickness direction along the rolling direction (RD) and transverse to the RD. Cell and subgrain sizes were determined in the same manner as for the earlier work.

32059 **The role of the invariant line in the search for an optimum interphase boundary by O-lattice theory.** Dahmen, U. (Lawrence Berkeley Lab., CA). *Scripta Metallurgica;* **15**: 77-81(1981). Contract W-7405-ENG-48.

The purpose of the present communication is threefold: to demonstrate that the interphase boundary can be shown analytically to have the lowest energy parameter P of all possible O-lattice boundaries; to explain the significance of the calculated 0.05-micron rotation around [0001] and its relationship to the more general principle of an invariant line; to show that the optimum interphase boundaries are generally different for coherent and semicoherent precipitates having the same OR with the matrix.

32060 **Flux growth in the Bi_2O_3-MoO_3 system.** De l'Eprevier, A.G.; Payne, D.A. (Univ. of Illinois at Urbana, Champaign). *Journal of Crystal Growth;* **51**: 377-379(1981). Contract AC02-76ER01198.

Crystal growth of bismuth molybdate based dielectric materials is reported. Stoichiometric and nonstoichiometric composition in the binary system MoO_3-Bi_2O_3 produced crystals of $3\ Bi_2O_3.2\ MoO_3$ and $Bi_2O_3.3\ MoO_3$. Bi_2MoO_6 and $Bi_2O_3.2\ MoO_3$ never formed. Attempts to stabilize Bi_2MoO_6 by flux additions were unsuccessful. Conditions of crystal growth for the binary and pseudoternary systems are given. $3\ Bi_2O_3.2\ MoO_3$ (6 x 3 x 2 mm) and $NaBi(MoO_4)_2$ (2 x 2 x 1 cm) grew readily. The results are discussed with respect to phase diagram information and potential future applications.

32061 **A TEM study of the evolution of strain-induced martensite.** Staudmanner, K.P. (Los Alamos National Lab., NM); Murr, L.E.; Hecker, S.S. pp 310-311 of 39. Annual Proceedings Electron Microscopy Society of America. Bailey, G.W. (ed.). Atlanta, GA; Electron Microscopy Soc. Amer. (1981).

We have demonstrated previously the effects of strain, strain state, strain rate, and temperature on the morphology of strain-induced martensite in type 304 stainless steel. In all cases α' martehsite nucleated at shear band intersections as suggested by Olson and Cohen, but the final morphologies were different. As the amount of martensite increased (with increasing strain, biaxial tension, low strain rates, and low temperatures), α' appeared more blocky and less lath-like. We have demonstrated that α' embryos grow by coalescence of new embryos, rather than actual growth.

32062 **Using an equation based on flow stress to estimate structural integrity of annealed type 304 stainless steel plate and pipes containing surface defects.** Reuter, W.G. (EG & G Idaho, Inc., Idaho Falls); Place, T.A. *International Journal of Pressure Vessels and Piping;* No. 9, 385-395(1981). Contract AC07-76ID01570.

An accurate assessment of the influence of defects on structural component integrity is needed. Generally accepted analytical techniques are not available for the very ductile materials used in many nuclear reactor components. This paper presents some results from a test programme to obtain data by which to evaluate proposed models. Plate and pipe specimens containing surface flaws were fabricated from annealed Type 304 stainless steel and tested at room temperature. An evaluation of an empirical equation based on flow stress is presented. In essentially all instances the flow stress is not a constant but varies as a function of the surface flaw.

32063 **Fractography of hydrogen-embrittled iron-chromium-nickel alloys.** Caskey, G.R. Jr. (E.I. du Pont de Nemours & Co., Aiken, SC). *Microstructural Science;* 9: 413-419(1981). Contract AC09-76SR00001.

Tensile specimens of iron-chromium-nickel base alloys were broken in either a hydrogen enviroment or in air following thermal charging with hydrogen. Fracture surfaces were examined by scanning electron microscopy. Fracture morphology of hydrogen-embrittled specimens was characterized by: changed dimple size, twin-boundary parting, transgranular cleavage, and intergranular separation. The nature and extent of the fracture mode changes induced by hydrogen varied systematically with alloy composition and test temperature. Initial microstructure developed during deformation processing and heat treating had a secondary influence on fracture mode.

32064 **Comparison of substructures between uniaxial and biaxial deformation in 1100-0 aluminum.** Rohr, D.L.; Hecker, S.S. (Los Alamos National Lab., NM). pp 52-53 of 39. Annual Proceedigns Electron Microscopy Society of America. Bailey, G.W. (ed.). Atlanta, GA; Electron Microscopy Soc. Amer. (1981).

As part of a comprehensive study of microstructural and mechanical response of metals to uniaxial and biaxial deformations, the development of substructure in 1100 Al has been studied over a range of plastic strain for two stress states.

32065 **Diffusion, correlation, and percolation in a random alloy.** Murch, G.E.; Rothman, S.J. (Argonne National Lab., IL). *Philosophical Magazine, [Part] A: Defects and Mechanical Properties;* 43: No. 1, 229-238(1981).

The relationship between physical correlation and tracer correlation in a random alloy and their bearing on the site percolation problem are discussed. Four Monte Carlo schemes are described for the calculation of the tracer and physical (vacancy) correlation factors. Results for the latter in the f.c.c. lattice are shown to be in excellent agreement with Manning's theory for concentrations greater than 0.4 of the mobile component. Below that concentration there is a slight deviation as the simulated and predicted vacancy correlation factors tend to zero at slightly different percolation thresholds. The site percolation threshold is determined to be 0.198+/-0.004, in excellent agreement with previous Monte Carlo studies.

32066 **The oxidation behavior of Fe-Cr alloys containing HfO_2-dispersed phase.** Goncel, O.T. (Lawrence Berkeley Lab., Ca.); Whittle, D.P.; Stringer, J. *Oxidation of Metals;* 15: No. 3/4, 287-295(1981). Contract W-7405-ENG-48.

The present investigation examines the high-temperature oxidation behavior of Fe-Cr ferritic alloys containing 1.0% Hf which has been converted into an oxide dispersion. The oxide dispersions were produced by an internal oxidation treatment using a 50-50 Cr-Cr_2O_3 powder mixture in a sealed quartz capsule at 1100°C; the samples were not in direct contact with the powders. The effect of the dispersed oxide was spectacular under isothermal oxidation conditions, but it had almost no effect during thermal cycling conditions. Unlike the TiO_2-containing Fe-Cr ferritic alloys, virtually no particle coarsening was observed. The absence of the coarse particles caused poor thermal cycling behavior, whereas in TiO_2-containing ferritic alloys, coarse particles acted as oxide pegs giving a keying-on effect.

32067 **(ORNL-tr—4971) Deformability of intermetallic compounds.** Izumi, O. Translated from *Nippon Kinzoku Gakkai Kaiho ;* 20: No. 6, 472-476(1981). Contract W-7405-ENG-26. 15p. NTIS, PC A02/MF A01. Order Number DE83010343.

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This report deals with the ductility (plastic deformation) of intermetallic compounds. Possibilities for plastic metal working are examined. Relations of yield stress are discussed. 8 figures. (DLC)

32068 **Single-site approximations for equilibrium and transport properties of random alloys.** Argyres, P.N. (Northeastern Univ., Boston, MA). *Physics Letters;* 78A: No. 2, 167-169(21 Jul 1980).

Introducing the configuration averaging as a projection operator, we propose a new formulation of the average t-matrix and the coherent potential approximations that treats on equal footing both the equilibrium and the residual transport properties of disordered alloys.

32069 **Magnetic structure of metallic holmium as a function of temperature.** Pechan, M.A. Ames, IA; Iowa State Univ. of Science and Technology (1977). 70p. University Microfilms Order No. 78-05,964.

Thesis (Ph. D.).

The magnetic structure of high purity, metallic Ho as a function of temperature has been studied, and the results of the study agree quite well with previous measurements. There are, however, some significant differences. The magnetic form factor has been calculated here using fully relativistic multipoles and is in excellent agreement with the present measurements. Third order satellites have been measured, and it has been quite well-established that they arise from the asphericity of the ionic magnetization density. The volume of the unit cell varies considerably less, with temperature, below the Neel temperature (T/sub N/) than it does above T/sub N/. Although the periodicity of the magentic structure agrees generally with the Elliot-Wedgewood theory, there are extra modulations which could give greater insight into the indirect exchange interaction. Below 100K there is evidence for a c axis modulated moment which has not previously been reported.

3602 Ceramics, Cermets, And Refractories

REFER ALSO TO CITATION(S) 31032, 31033, 31219, 31293, 31555, 31555, 31709, 31710, 31710, 31998, 32022, 32239

32070 **(AERE-MPD/NBS—169) Room temperature study of uranium dioxide by pulsed neutron powder diffraction.** Knowles, K.J.; Radhakrishna, P.; Willis, B.T.M.; Windsor, C.G. (UKAEA Atomic Energy Research Establishment, Harwell. Materials Physics Div.). Apr 1981. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700898.

Neutron diffraction data have been recorded on polycrystalline uranium dioxide, using the time-of-flight method with the Harwell Back-Scattering Spectrometer and the 45 MeV electron linac. Good diffraction intensities were maintained up to Q vectors (Q=4πsintheta/lambda) as high as $22A^{-1}$. The data were analysed by the Rietveld Profile Refinement procedure, yielding an R factor of 5.0% which is close to that expected from counting statistics alone. The refined values of the thermal parameters are Bsub(U) = 0.215 (14) A^2 and Bsub(O) = 0.485 (17) A^2 corresponding to r.m.s. thermal displacements at room temperature of 0.052A for the uranium atoms and 0.078A for oxygen. These B values are close to those already obtained on single crystals and powders with fixed-wavelength neutron diffractometers. Because the new B values are derived from measurements extending over a much wider range of Q, it is believed that they are more precise than the earlier estimates.

32071 **(BMFT-FB-T—82-178) Development of high-temperature resistant noncorrodible silicon-carbide components for gas turbine application.** Schindler, S.R.; Krauth, A. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 59p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750247.

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The report under review describes the work of phase 2 (1978-1980) of the project 'Ceramic Materials for Automobile Gas Turbines', which has been sponsored by the Ministry for Research and Technology of the Federal Republic of Germany since 1974. Special effort has been put on the improvement of different silicon carbide materials and suitable production techniques for the production of static gas turbine components and a heat exchanger prototype. Tight connection of production techniques, construction and testing in simulated application conditions made it possible to transfer improved material data from test specimens to structural components. Prototypes of combustion chambers, stators and heat exchangers were produced and tested. The positive test results as well as the improved material data of the different silicon carbide

materials do speak for a successful continuation of the R and D project.

32072 **(CONF-820929—14) Effect of superconductivity on spin dynamics in (Y/sub 1-x/Re/sub x/)Rh_4B_4.** Kumagai, K.; Fradin, F.Y. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83010775.

From IUPAP international conference on magnetism; Kyoto, Japan (6 Sep 1982).

An adiabatic field-cycle method has been used to study spin dynamics of RE ions in (Y/sub 1-x/RE/sub x/)Rh_4B_4. Longitudinal dipolar fluctuations of RE moments are found to be the main source of the nuclear spin-lattice relaxation time of ^{11}B. The variation of T_1 in the superconducting state is attributed to the reduction of the electronic spin-relaxation time, tau/sub m/, which is mainly determined by the RKKY type interaction mediated by the conduction electrons. 3 figures.

32073 **(CONF-8209127—1) Stability of (001) CSL twist boundaries in MgO: a theoretical study.** Wolf, D. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83010755.

From Structure and properties of intergranular boundaries meeting; Caen, France (6 Sep 1982).

The energies of (001) coincident-site twist boundries in MgO have been calculated by means of a computer code developed in recent years. Both the empirical interionic potentials of Catlow, Faux, and Norgett as well as the electron gas potentials of Mackrodt and Stewart have been applied. It is concluded that, in contradiction to the MgO bicrystal experiments of Sun and Balluffi, (001) grain boundaries in pure MgO are unstable above room temperature since their main cohesive force arises from rather weak Vander-Waals attractive interactions between oxygen ions on opposite sides of the interface, while Coulomb interactions do not contribute to the cohesion. A calculation of the binding energy of the isovalent substitutional impurities Fe^{2+} and Ca^{2+} to the $\Sigma = 5$ boundary on the one hand and to the free (001) surface on the other yields the interesting result that impurities may contribute to the stabilization of such bicrystals since they may be bound more tightly to the grain boundary than to the free surface. it is therefore concluded that Sun and Balluffi's bicrystals have been stabilized by substantial amounts of impurities having migrated into the grain boundary during the high-temperature pressure-sintering process.

32074 **(DOE/ER/04217—7) Plastic deformation in oxide ceramics. Final report.** Heuer, A.H. (Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Metallurgy and Materials Science). Dec 1982. Contract AC02-77ER04217. 8p. (COO—4217-7). NTIS, PC A02/MF A01. Order Number DE83011047.

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Plastic deformation in two non-stoichiometric oxide system - oxygen-rich UO/sub 2+x/ and Al-rich Mg-Al spinels, has been studied. In spinel, both stoichiometric and nonstoichiometric crystals were deformed at elevated temperatures and climb and climb-dissociation of <110> dislocation was ubiquitous. However, the marked composition-softening in this system, Al-rich crystals being much easier to deform than stoichiomeric crystals, was attributed to an intrinsic decrease of the stacking fault energy for glide dissociation with increasing Al/Mg ratio. In UO/sub 2+x/, the effects of O/U ratio on single crystals oriented either to suppress or promote (100)<110> slip are described. Either (111)<110> or (100)<110> slip can occur; the former is favored at low temperatures and high O/U ratios. The critical resolved shear stress for (111) slip decreases with increasing O/U ratio, while that for (100) slip is nearly constant with O/U ratio. Defect complexes are present in such oxygen-rich crystals and may re-orient in the stress fields of moving dislocations. This and their possible role in scavenging other impurity defects are believed to be involved in the variation of flow stress with O/U ratio.

32075 **(DOE/ER/72035—T1) Evaporation-driven liquid sintering. Final report.** Whelan, J.M. (University of Southern California, Los Angeles (USA)). [nd]. Contract AT03-76ER72035. 15p. NTIS, PC A02/MF A01. Order Number DE83011004.

The research program was conducted using MgO-LiF and SiC as materials. (DLC)

32076 **(KFK—3414) Investigation of slow crack growth on hot-pressed silicon nitride at high temperatures.** Steinmann, D. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung). Oct 1982. 178p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83750420.

Portions are illegible in microfiche products; Thesis.

Hot-pressed silicon nitride (HPSN) is a dense, non-oxide ceramic material, which can be considered a significant representative of modern high-performance ceramics thanks to its exceptional mechanical properties, which are maintained even at high temperatures. This paper examines static fatigue caused by slow crack growth on various HPSN-qualities doped deliberately with predetermined quantities, thus extending present knowledge and unterstanding of HPSN-materials. The results obtained clear the way for continuing material development and allow better judgement of the applicability of HPSN as well as better assessment of life under different load conditions.

32077 (KFTI—81-7, pp 17-27) **Low temperature exciton decay with defect production in ionic crystals.** Lushchik, Ch.B.; Vasil'chenko, E.A.; Lushchik, A.Ch. (AN Ehstonskoj SSR, Tartu. Inst. Fiziki). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

A review where production processes of radiation defects (RD) in consequence of electron excitation (EE) decay have been considered on the example of alkali-haloid crystals (AHC) of CsBr (BCC) and KBr(FCC) is presented. Short enumeration of electron excitations and elementary radiation defects in AHC was followed by the description of the whole transformation chain of EE and RD beginning from the state of a free exciton or electron-hole pair through the state of autolocalized excitons to separated. F, H pairs which are partially recharged with formation of the charged Frenkel defects.

32078 (KFTI—81-7, pp 60-61) **Radiation centers of the halide impurity in alkali-halide crystals.** Davitashvili, T.Sh.; Zhvaniya, M.F. (AN Gruzinskoj SSR, Tbilisi. Inst. Fiziki). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Optical absorption spectra of KCl, KBr, NaCl crystals alloyed with different haloids and irradiated in gamma circuit or in a reactor at low (120 K) and usual (300-340 K) temperatures have been investigated. Intensive bands resulted from the appearance of painting centers named Q centers were observed in the spectral region of 700-900 nm. Factors affecting the formation process (concentration of impurity haloid, irradiation temperature and dose) have been revealed; thermal decay (Q_3, Q_4) has been observed. Parameters have been observed and a scheme for the Q centers appearance process has been suggested. It is concluded that the Q centers are radiation defects of a lattice structure of alcalihaloid crystals alloyed with haloids.

32079 (KFTI—81-7, pp 62-64) **Thermal conductivity of irradiated MgO crystals.** Kvachadze, V.G.; Abramishvili, M.G.; Kalabegishvili, T.L. (AN Gruzinskoj SSR, Tbilisi. Inst. Fiziki); Altukhov, V.I. (AN Ehstonskoj SSR, Tartu. Inst. Fiziki). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Effect of gamma irradiation on low-temperature thermal conductivity of MgO crystals has been investigated. Spectra of optical absorption and EPR were measured sumultaneously. Structural distortions of the lattice in the form of the Frenkel pairs of defects take place in the irradiation process along with change in the

valent state of paramagnetic ion ($Fe^{2+} \rightarrow Fe^{3+}$, $Cr^{3+} \rightarrow Cr^{2+}$). It is established that the radiation change of thermal conductivity is determined with the above valent transformations: phonon scattering with Cr^{2+} ions. The thermal conductivity of the MgO crystals has been calculated with provision for the phonon scattering by radiation distortions. Cr^{2+} ion concentration values and data on the efficiency of the Rayleigh and anharmonic phonon scatterings in the MgO crystals have been obtained from the comparison of calculational results and corresponding experiments.

32080 **(NP—3901178) Study of instabilities in the electrical properties of the Si-SiO_2 boundary surface.** Werner, C. (Technische Univ. Muenchen (Germany, F.R.). Fakultaet fuer Elektrotechnik). 22 Feb 1980. 168p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83901178.

Thesis.

In this work the physical changes at the Si-SiO_2 boundary surface have been studied which arise in a MOS-structure at higher temperatures if an electric voltage is applied. Besides the oxid charges and the boundary surface level density, the local surface potential fluctuations have been measured for the first time. These parameters are obtained by high precision capacity and conductivity measurements of MOS-condensors.

32081 **Occupied interstices in stoichiometric and hyperstoichiometric $V_2H(D)$.** Westlake, D.G. (Argonne National Lab., IL (USA)). *Materials Letters;* **1**: No. 3-4, 107-110(Dec 1982).

A geometric model based on criteria of a minimum hole size for occupation by H(D) and a minimum distance between pairs of H(D) atoms has been applied to $V_2H(D)$. The model allows a rationalization for the observed occupation of octahedral osub(z1) sites in the stoichiometric compound and for randomization in all osub(z) sites in the hyperstoichiometric V_2H.

32082 **Comparative evaluation of selected alternative nuclear waste forms.** Wald, J.W.; Shade, J.W.; Lokken, R.O.; Rusin, J.M. (Pacific Northwest Lab., Richland, WA (USA)). *Radioactive Waste Management and the Nuclear Fuel Cycle;* **3**: No. 2, 215-239(Dec 1982).

Mechanical strength, volatility and leach resistance tests have been conducted on ten representative alternative waste form materials. Glass PNL 76-68, celsian glass ceramic, and SPC-5B supercalcine waste forms ranked the highest in overall performance while the 100% PW-9 calcine forms had the least desirable properties. Glass PNL 76-68 had the highest mechanical strength, measured by diametral compression; both glass PNL 76-68 and SPC-5B supercalcine have volatile losses less than 3×10^{-2} mg/mm^2 at temperatures below 1100°C. These two waste forms also provided the best overall leach resistance. Processing techniques such as hot pressing or hot isostatic pressing did not produce a significantly better product over conventional cold press and sintering techniques for SPC-5B supercalcine or PW-9 calcine.

32083 **Effect of paramagnetic impurities on proton spin relaxation in yttrium dihydride.** Belhoul, M.; Styles, G.A.; Seymour, E.F.W. (Warwick Univ., Coventry (UK). School of Physics); Phua, T.T.; Barnes, R.G.; Torgeson, D.R.; Peterson, D.T. (Ames Lab., IA (USA); Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Physics; Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Materials Science and Engineering). *Journal of Physics F: Metal Physics;* **12**: No. 10, 2455-2462(Oct 1982).

Pulsed NMR measurements of the proton spin-lattice relaxation time, T_1, in yttrium dihydride containing controlled amounts of gadolinium are reported over the temperature range 140-1250 K. Addition of gadolinium produces a temperature-dependent relaxation contribution which is proportional to gadolinium concentration and gives rise to a subsidiary minimum on the low-temperature side of the main minimum due to proton-proton dipolar interactions. The results are interpreted in terms of a magnetic dipolar interaction between the Gd^{3+} paramagnetic ions and the protons. The possibility that some of the diffusion data deduced from previous NMR measurements has been affected by the unsuspected presence of paramagnetic impurities is discussed.

32084 **Hydrogen vapor pressure measurements over a portion of the Lu-H system.** Subramanian, P.R.; Smith, J.F. (Ames Lab., IA (USA)). *Journal of the Less-Common Metals;* **87**: No. 2, 205-213(Oct 1982).

Hydrogen vapor pressures were measured over the Lu-H system using Sieverts' technique and covered the composition range lutetium to LuH_3 and the temperature range 825-950°C. The measurements allowed delineation of the phase boundaries for the temperature range 0-1000°C. Combination of the present data with earlier measurements showed consistency and allowed evaluation of the enthalpy and entropy of formation of LuH_3 as $\Delta Hsub(f)^\circ = 204.8 +- 1.9$ kJ mol^{-1} and $\Delta Ssub(f)^\circ = 136 +- 2$ J mol^{-1} K^{-1}. The results make dubious the validity of an earlier suggestion of metastability of LuH_3 at temperatures below 170°C.

32085 **High-temperature deformation of cubic oxides.** Routbort, J.L. (Argonne National Lab., IL). *Journal de Physique (Orsay, France);* **6**: No. 42, 59-65(Jun 1981).

The stress-strain curves for MgO and NiO have a work-hardening rate Θ that decreases linearly with increasing stress to a steady state ($\Theta=0$) while the curve for CoO has an upper yield point and a work-hardening rate that is negative but increases to zero when steady state is achieved. These results predict that the shapes of the creep curves for NiO and MgO are similar, and different from those obtained for CoO. Finally, the steady-state stress tau/sub s/ divided by the shear modulus is very similar for all three oxides, with NiO having the largest value. The functional dependence of tau/sub s/ on temperature T for all three oxides is given by log tau/sub s/ = B- T/A, where B and A are constants.

3603 Composite Materials

REFER ALSO TO CITATION(S) 31578, 31787, 31788

32086 **(UCRL—53365) Statistics for the time-dependent failure of Kevlar-49/epoxy composites: micromechanical modeling and data interpretation.** Phoenix, S.L.; Wu, E.M. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 25p. NTIS, PC A02/MF A01. Order Number DE83011087.

This paper presents some new data on the strength and stress-rupture of Kevlar-49 fibers, fiber/epoxy strands and pressure vessels, and consolidated data obtained at LLNL over the past 10 years. This data are interpreted by using recent theoretical results from a micromechanical model of the statistical failure process, thereby gaining understanding of the roles of the epoxy matrix and ultraviolet radiation on long term lifetime.

32087 **Radiation technology of wood-plastic composite materials.** Czvikovszky, T. (Mueanyagipari Kutato Intezet, Budapest (Hungary)). pp 128-129 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/44P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32088 **Electron-beam curing for wood-products finishing.** Achmatowicz, T.; Jozwiak, H.; Wincel, H. (Institute of Nuclear Research, Warsaw (Poland)). pp 132 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/63P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

3604 Polymers And Plastics

REFER ALSO TO CITATION(S) 31534, 31535, 32239

32089 **(AERE-R—10085) Positron annihilation measurements on cured epoxide resins.** Smith, F.A.; Hughes, A.E.; Coleman, C.F.; Scott, J.M. (UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.). Feb 1981. 8p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700900.

Samples of MY 750 epoxide resin cured with five different agents have been examined with the positron annihilation Doppler technique before and after mechanical stressing. Significant differences in the line shape parameter S have been found between samples cured with polyamines and with methylnadic anhydride, and there is some evidence that differences exist between different batches of samples cured with the same agent. Mechanical stressing caused an increase in S only for resins cured with ethylene diamine and triethylene tetramine when stressed by three-point loading.

32090 **(BMFT-FB-T—82-186) Study on plastic pipes.** Tautz, A. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 42p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750253.

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District heating pipelines are usually placed by using medium pipes consisting of steel; it is only in some exceptional cases that plastics are used. In future, plastics could be used for district heating subdistribution in competition with steel pipes provided that pressure and temperature loads will not be too high. The most important advantage of plastics is their anticorrosion property. As far as pipes consisting of glassfibre reinforced EPOXID-plastics or of cross-linked polyethylene are concerned, a test piping had been installed by which it was possible to prove that these pipes are appropriate under technical aspects and that they are economical, too. The pipelines and their simplified thermal insulations consisting of bulk material in granulate or powder form had been operated with success, during a five years' test period.

32091 **(BMFT-FB-T—82-197) Investigation of the thermal ageing of rigid expanded polyurethane in distant-heat pipes.** Nolte, K. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 231p. (In German). NTIS (US Sales Only), PC A11/MF A01. Order Number DE83750251.

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The objective of the investigation was to find out or to develop test methods, describing the thermal ageing behaviour of rigid expanded polyurethane (PUR). Besides the mechanical compression test especially analytical methodes, for example the thermal analysis and infrared spectroscopy, have been used to determine thermal ageing mechanisms quantitatively. Based on a specific limited-value criterion for PUR materials a lifetime-temperature correlation has been evolved for a test foam. Furthermore an operation draft has been developed to estimate thermal ageing behaviour of PUR in distant heat pipe-in-pipe systems. This has been applied to a series of commercial foams and pipe systems successfully.

32092 **(DOE/ER/10912—2) Rubber elasticity. Progress report, February 2, 1982-March 30, 1983.** Eichinger, B.E. (Washington Univ., Seattle (USA). Dept. of Chemistry). 1983. Contract AT06-81ER10912. 6p. NTIS, PC A02/MF A01. Order Number DE83011456.

Research is reported in three areas: differential sorption (swelling of elastomers), random networks (curing), and polymeric chelates (acetylacetone-substituted styrene-isoprene copolymer and polydimethyl-siloxane). (DLC)

32093 **(GEPP-TIS—732) Low-pressure-transfer molding of silicon rubber compounds.** Collins, J.P. (General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.). 9 May 1983. Contract AC04-76DP00656. 9p. NTIS, PC A02/MF A01. Order Number DE83011568.

Long, thin silicon rubber parts have been molded in small volumes using a transfer molding technique which eliminates voids as well as the longitudinal parting line. The process uses inexpensive tooling and does not require the use of a press. The tooling features a resin pocket which doubles as the lower mold-half. As the upper mold force descends into the pocket, the resin is forced upward through the cavity, effectively evacuating it. Normal curing and demolding follow. 6 figures.

32094 **(KFK-PFT—7) Calculation of injection mouldings by simulation models.** Kemper, W.; Bauer, E.; Wojcik, W. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekttraegerschaft Fertigungstechnik). Jun 1982. 49p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750024.

The filling phase is very important for the quality and the costs of thermoplastic injection mouldings. The terms for distributions of temperature, pressure, shear rate, shear stress and velocity were derived from the balance equitations of continuity, motion and energy, considering the filling conditions. Possibilities for calculation, programs and graphic methods were developed for the simulation of the filling phase of thermoplastic injection mouldings. This methods were used for different examples and the accuracy proofed by comparison with measurements.

32095 (KFTI—81-7, pp 65-69) **Measuring methods of radiation-induced dielectric conductivity.** Khoroshen'kov, Eh.P.; Filatov, N.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Analysis of the existing methodology for determining radiation electric conductivity (EC) of solid dielectrics has been performed using polyethylene and polytetrafluoroethylene. This analysis has revealed considerable divergence of these dielectric resistivity to instantaneous, EC in different experiments. It is concluded that the existing technique of recalculation of change in dielectric resistance to its EC has an artificial nature. It is shown analytically and experimentally that the correct EC determination is possible with provision for the radiation defects induced in the dielectric with high-energy charged particles and resulted from the production of low-energy charged particles.

32096 **(BDX—613-2943) Thermoset precursor.** Yamamoto, Y. (Sumitomo Electric Industries Ltd., Osaka (Japan); Bendix Corp., Kansas City, MO (USA)). Apr 1983. Contract AC04-76DP00613. Translation of Japanese Patent Application No. 1979-94,287. 17p. NTIS, PC A02/MF A01. Order Number DE83011131.

This invention pertains to a distinctive thermoset precursor which is prepared by mixing a resin composition (A) which can be hardened by ionizing radiation, and a resin composition (B) which can be hardened by heat but cannot be hardened by, or is resistant to, ionizing radiation, and by coating or impregnating a molding or other substrate with a sheet or film of this mixture and irradiating this with an ionizing radiation. The principal components of composition (A) and (B) can be the following: (1) an acrylate or methacrylate and an epoxy resin and an epoxy resin hardener; (2) an unsaturated polyester resin and epoxy resin and an epoxy resin hardener; (3) a diacrylate or dimethacrylate or polyethylene glycol and an epoxy resin; (4) an epoxy acrylates or epoxy methacrylate obtained by the addition reaction of epoxy resin and acrylic or methacrylic acid.

32097 **Production of super-smooth articles.** Duchane, D.V. (to Dept. of Energy). US Patent 4,376,751. 15 Mar 1983. Filed date 29 May 1981. vp.

PAT-APPL-268425.

Super-smooth rounded or formed articles made of thermoplastic materials including various poly(Methyl methacrylate) or acrylonitrile-butadiene-styrene copolymers are produced by immersing the articles into a bath, the composition of which is slowly changed with time. The starting composition of the bath is made up of at least one solvent for the polymer and a diluent made up of at least one nonsolvent for the polymer and optional materials which are soluble in the bath. The resulting extremely smooth articles are

useful as mandrels for laser fusion and should be useful for a wide variety of other purposes, for example lenses.

32098 **Thermal analysis of grafted fibres.** Sundardi, F.; Marlijanti, I.; Kadarijah (Centre for the Application of Isotopes and Radiation, Jakarta, Indonesia). pp 129 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/49P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32099 **High-grade precoated steel sheet by electron-beam curing.** Fujioka, S.; Fujikawa, J. (Toray Industries, Inc., Otsu, Japan); Ueno, N.; Okamoto, A. (Nippon Steel Corp., Tokyo). pp 130 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/52P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32100 **Radiation processing of polyethylene.** Jaworska, E.; Robalewski, A.; Wincel, H. (Institute of Nuclear Research, Warsaw (Poland)). pp 131 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/62P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32101 **Development of materials with blood compatibility by radiation processing.** Roesinger, S.; Fischer, J.P. (Hoechst A.G., Frankfurt am Main (Germany, F.R.)); Fuhge, P. (Behringwerke AG, Marburg, Germany, F.R.). pp 323-341 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/107; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Biomedical applications, for example for rendering plastic materials blood compatible, have become a very important problem in recent years. Surface-grafted materials for blood compatibility have attracted attention for intra- and extracorporal applications. Numerous aspects of grafting monomers onto polymer surfaces by different grafting methods have been given. A large amount of work has been done during the last ten years, but nobody has prepared materials with properties that are desirable for long-term medical application in the human body, for example as replacements for small arteries or veins. The evaluation of blood compatibility of different plastic materials, and the search for correlations between blood compatibility and physical properties of the plastic materials surfaces, are well-known problems in the biomedical applications of polymers. This paper briefly reviews an approach to help solving these problems.

32102 **Articulated prostheses based on polymers improved by the action of ionizing radiations.** Gaussens, G.; Nicaise, M.; Tran, K.O. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Office des Rayonnements Ionisants). pp 373 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/19P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32103 **Need for supercomputers in time-dependent polymer simulations.** Bishop, M. (Fordham Univ, New York, NY); Ceperley, D.; Frisch, H.L.; Kalos, M.H. *ACS Symposium Series;* No. 173, 135-142(1981). Contract AC02-76ER03077.

A number of theoretical computer simulations of polymer structure have been made. The nature of static and dynamic properties of concentrated polymer systems was the focus of this work. Difficulties in simulating polymer systems stem from the long relaxation times of polymer chains that the systems display. Chain lengths studies here required about 5000 steps for adequate relaxation. Thus, about 1.7 x 10^7 or 10^4 h of CPU time would be required for larger systems. This amount of CPU time, along with other polymer problems, presents a problem which is unapproachable with the present generation of computers, even a CDC 7600. 27 references. (BLM)

3606 Other Materials

REFER ALSO TO CITATION(S) 31289, 31289, 31388, 31403, 31424, 31427, 31450, 31451, 31452, 31455, 31969, 32082

32104 **(BNL—32685) Polarized neutron study of the magnetization density distribution within a $CoFe_2O_4$ colloidal particle (magnetization density in a colloidal $CoFe_2O_4$ crystallite).** Nunes, A.C.; Majkrzak, C.F.; Berkowitz, A.E. (Rhode Island Univ., Kingston (USA). Dept. of Physics; Brookhaven National Lab., Upton, NY (USA); General Electric Co., Schenectady, NY (USA). Corporate Research and Development Center). 1983. Contract AC02-76CH00016. 12p. (CONF-830619—1). NTIS, PC A02/MF A01. Order Number DE83010015.

From 3. international conference on magnetic fluids; Bangor, UK (28 Jun 1983).

Magnetization and Moessbauer data suggest that a magnetically anomalous region exists within finely divided $CoFe_2O_4$ particles when coated with oleic acid. We have undertaken an x-ray and a polarized neutron powder diffraction study of these samples with and without the surfactant coating in an attempt to locate and characterize this anomalous zone. The shape of neutron scans of the (4,0,0) reflection are independent of polarization indicating that the reflecting crystallites are uniformly magnetized. Magnetization calculated from the peak flipping ratio is characteristic of uncoated rather than coated particles in both cases. Scan widths of both x-rays and neutrons are narrower for the sample from which the chemisorbed surfactant has been largely removed indicating an increase in the size of the coherent lattice of a crystallite. These observations are consistent with the existence of a highly strained surface layer roughly 10 Angstroms thick characterized by pinned spins associated with the presence of oleic acid, which relaxes to a more normal lattice structure upon boiling off the surfactant.

32105 **(DOE/ER/05781—T3) Ionic transport and electrical relaxation in glass. Proposal for renewal of USDOE contract No. DE-AS05-78ER05781, 1 April 1982-31 Jul 1982.** Moynihan, C.T. (Catholic Univ. of America, Washington, DC. Dept. of Chemistry). Mar 1982. Contract AS05-78ER05781. 8p. NTIS, PC A02/MF A01. Order Number DE83011585.

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Precise electrical conductivity measurements have been carried out over a wide temperature range (-11 to 300°C) on a set of six glasses of molar composition 0.25 [XNa_2O + (1-X)K_2O] -0.05 Al_2O_3 - 0.70 SiO with X in the range 0.95 to 1, in order to verify a weak electrolye model of alkali ion conductivity. Results indicate that the percentage of mobile Na^+ ions in the single alkali glass varies from about 1% at -10°C to 5% at 300°C, results fairly similar to those obtained for a 0.25 K_2O - 0.75 SiO_2 glass.

32106 **(DOE/PC/50796—T1) Diffusion of gases in porous solids: simulations and measurements. Third quarterly progress report, January 16, 1983-April 15, 1983.** Evans, J.W. (California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering). 1983. Contract FG22-82PC50796. 4p. NTIS, PC A02/MF A01. Order Number DE83011610.

A diffusion-bridge apparatus was utilized. Pure Ar and CO_2 are counter diffused. Sensitivity of the apparatus to pressure differences across the porous plug was measured. (DLC)

32107 (INIS-mf—7557, pp vp) **Discussion on criterions of crack initiation in fatigue under 3.D loadings.** van Dang, K. (Ecole Polytechnique, 91 - Palaiseau (France). Lab. de Mecanique des Solides). 1982. NTIS (US Sales Only), PC A02/MF A01. (CONF-820990—Absts.).

From 152. EUROMECH colloquium - experimental ayalysis of nonlinear problems in solid mechanics; Wuppertal, F.R. Germany (21 Sep 1982).

32108 **(UCRL—53366) Property of cellular silicone from high-vinyl silicone gums as a function of porosity (referenced to SE54 gum).** Cady, W.E.; Jessop, E.S.; McKinley, B.M. (Lawrence Livermore National Lab., CA (USA)). 20 Aug 1982. Contract W-7405-ENG-48. 63p. NTIS, PC A04/MF A01. Order Number DE83011593.

We have established the load-deflection properties of cushions from the high methylvinylsiloxane (MVS) content gums, L97KVB-0.7, MN97KVB-0.7, and L60VB-0.7, as a function of cushion porosity. These properties are referenced to the properties of cushions from General Electric's (GE) SE54 gum which has considerably less MVS. The higher MVS gums produce considerably stiffer cushions. We have also evaluated the confined compression set of these various porosity cushions. There is no pattern for set as a function of porosity. Set is reduced at the higher MVS contents. We have established the densities of the cured solid elastomers (3219) from the four silicone gums. We have also calculated a linear relationship between porosity of the cushions and the wt % of urea temporary filler in the molding compound for the 97-type gums and L60 gum. L97KVB-0.7 and MN97KVB gums produce cushions with similar but not exactly the same load-deflections and sets, and are alike in their correlations of porosity with urea loading. L60VB-0.7 produces a softer cushion and probably has less set than the 97-type gums at 0.7% MVS. 13 figures, 36 tables.

32109 **Recrystallization of buried amorphous layers and associated electrical effects in P^+-implanted Si.** Sadana, D.K.; Washburn, J. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.; California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering); Booker, G.R. (Oxford Univ. (UK). Dept. of Metallurgy). *Philosophical Magazine, [Part] B: Electronic, Optical and Magnetic Properties;* **46**: No. 6, 611-633(Dec 1982).

The recrystallization behaviour of a buried amorphous layer formed by P^+ implantation in (111) Si has been studied using transmission electron microscopy (TEM), secondary-ion mass spectroscopy (SIMS) and Hall measurements. Special TEM specimen preparation techniques were used to study individual sub-surface damage regions in the as-implanted as well as the annealed samples. The TEM results showed that the recrystallization of the amorphous layer began slowly, increased rapidly above 550°C and was complete at 600°C. At temperatures between 750 and 1000°C, two discrete layers of interstitials a/2<110> and a/3<111> dislocation loops formed below the specimen surface, and the surface region contained stacking-fault tetrahedra. The SIMS results showed that pronounced segregation of phosphorus atoms occurred in the defect-rich regions at 750°C. At higher annealing temperatures P segregation still occurred, but the magnitude of the segregation was reduced because of diffusive effects. The segregation results correlated with the asymmetry in the inside-outside diffraction contrast results of the dislocation loops. The asymmetry was a maximum in the 750°C annealed specimen, and decreased progressively with increasing annealing temperature. Electrical profiles showed decreases in carrier concentration and/or mobility in the defect-rich regions.

32110 **Reduction of organic solvent emission by industrial use of electron-beam curable coatings.** Haering, E. (BASF Farben und Fasern AG, Paint Research Dept., Cologne, Germany, F.R.). pp 235-253 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/106; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Most industrial finishing processes operate by the use of liquid organic coating materials drying by solvent evaporation and subsequent chemical crosslinking reactions, in many cases also releasing cleavage products. These organic emissions contribute to air pollution and therefore many countries have issued restrictions in order to protect the environment. Complementary to other modern methods for reducing this problem, radiation chemistry enables an approach by radical chain polymerization which can be induced by exposure to electron radiation. This procedure is known as electron-beam curing of coatings or the EBC process. It utilizes well-developed accelerator equipment with voltages of 150 to 400kV at a minimum energy consumption. There is no necessity to use irradiation facilities based on the decay of radioisotopes. Free radical polymerization requires unsaturated resins as pain binders and polymerizable liquid compounds (monomers) as reactive diluents. Their crosslinking yields a high molecular network, the coating, without any emission of organic solvents or cleavage products. Moreover, the radiochemical formation of the paint film occurs extremely rapidly. The technical application of EBC coatings began by coating automotive plastic parts; a little later the finishing of wood products gained more industrial use as a non-polluting and energy-saving coating technology. Application methods in coating plastic foils in combination with vacuum metallizing and the production of decorative laminating papers for furniture followed. In 1981 new EBC pilot lines were installed for curing top coats on PVC foil and also for the coating of prefinished steel wheels for automobiles. In comparison with conventional solvent-based methods the industrial EBC process results in a nearly complete reduction of organic solvent emission avoiding air pollution and saving valuable petrochemical raw materials. This paper reviews the development of EBC during the last decade.

40 CHEMISTRY

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4001 Analytical And Separations Chemistry

REFER ALSO TO CITATION(S) 31080, 31081, 31082, 31134, 31249, 31311, 31313, 31356, 31645, 32158, 32166, 32206, 32251, 32481, 32686

32111 **(AD-A—123070/5) Method for measuring enriched levels of deuterium in soil water. Special report.** Oliphant, J.L.; Jenkins, T.F.; Tice, A.R. (Cold Regions Research and Engineering Lab., Hanover, NH (USA)). Nov 1982. 17p. NTIS, PC A02/MF A01.

This report describes procedures for analyzing hydrogen isotope ratios. Hydrogen is separated from liquid water or soil water by reacting the water with heated uranium. An isotope-ratio mass spectrometer determines the atom % deuterium in the hydrogen to a precision of + or - 0.0075. Ways of upgrading the mass spectrometer to obtain better precision are also discussed.

32112 **(CONF-810705—9) Propagation of errors in quantitative AEM microanalysis using XEDS and EELS.** Zaluzec, N.J. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83010706.

From 16. annual conference of the Microbeam Analysis Society; Vail, CO, USA (13 Jul 1981).

A general expression has been derived relating the relative error in a composition measurement to relative errors in the respective input parameters needed for quantitative XEDS and EELS microanalysis.

32113 **(DPST—82-86-4/5) Hydrogen-Isotope Mass-Spectrometer Evaluation Program. Bimonthly progress report, July/September 1982.** Chastagner, P.; Daves, H.L.; Hess, W.B. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant; Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 1982. Contract AC09-76SR00001. 25p. NTIS, PC A02/MF A01. Order Number DE83012088.

The joint SRL-SRP Hydrogen Isotope Mass Spectrometer Evaluation Program was undertaken to: (1) evaluate a prototype hydrogen isotope mass spectrometer that was developed for the Mass Spectrometer Technical Group by VG-Isotopes, Ltd., and (2) obtain sufficient data to permit SRP personnel to specify the mass spectrometes that will be purchased under Schedule 44 Budget Project 81-SR-010 to replace obsolete mass spectrometers in Buildings 232-H and 224-H.

32114 (INIS-mf—7497, pp 38-39) **Development trends in the field of X-ray spectroscopy.** Wegscheider, W.; Marageter, E.; Mueller, K. (Technische Univ., Graz (Austria). Inst. fuer Allgemeine Chemie, Mikro- und Radiochemie). 1982. (In German and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32115 (INIS-mf—7497, pp 48-49) **Effect of grain size on the X-ray fluorescence analysis of powder samples.** Duemecke, G. (Akademie der Wissenschaften der DDR, Berlin. Zentralinstitut fuer Anorganische Chemie. 1982. (In German and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32116 (INIS-mf—7497, pp 58-59) **Application of X-ray fluorescence spectrometry in water pollution analysis.** Holynska, B.; Markowicz, A. (Institute of Physics and Nuclear Techniques, Krakow (Poland)). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32117 (INIS-mf—7497, pp 74-75) **Quantitative X-ray fluorescence analysis of silicates having various compositions in wide concentration ranges.** Traeger, T. (Szilikatipari Koezponti Kutato es Tervezoe Intezet, Budapest (Hungary)). 1982. (In Hungarian and German). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32118 (INIS-mf—7497, pp 76-77) **X-ray fluorescence analysis for environmental, geochemical and biomedical applications.** van Grieken, R.; Robberecht, H.; van Dyck, P.; van't Dack, L.; Vos, L. (University of Antwerpen (U.I.A.), Antwerpen (Belgium). Dept. of Chemistry). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32119 (INIS-mf—7497, pp 186-187) **Mass spectrometric analysis of chemical reactions in r.f. discharge.** Todorovic, M.; Ikonomov, N.; Holclajtner-Antunovic, I.; Kovacic, N.; Zdraveski, M. (Belgrade Univ. (Yugoslavia)). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32120 (INIS-mf—7497, pp 200-201) **Mass spectrometric measurements in fermentation technology.** Bohatka, S.; Langer, G.; Berecz, I. (Magyar Tudomanyos Akademia, Debrecan. Atommag Kutato Intezete); Szilagyi, J. (BIOGAL Gyogyszergyar, Debrecen (Hungary)). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32121 (INIS-mf—7497, pp 202-203) **Mass spectrometric 'in vivo' measurements of gases in plants.** Langer, G.; Bohatka, S.; Schlenk, B.; Bornemisza-Pauspertl, P. (Magyar Tudomanyos Akademia, Debrecan. Atommag Kutato Intezete); Buzas, I.; Partay, G. (Magyar Tudomanyos Akademia, Budapest. Talajtani es Agrokemiai Kutato Intezet); Sagi, F.; Mozsik, L. (Gabonatermesztesi Kutato Intezet, Szeged (Hungary)). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32122 (INIS-mf—7497, pp 204-205) **Investigation of phenol-formaldehyde resins by mass spectrometry.** Prokai, L. (Magyar Asvanyolaj es Foeldgaz Kiserleti Intezet, Veszprem). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32123 (INIS-mf—7497, pp 206-207) **Mass spectrometric investigation of 5-substituted-4-oxo-1,4-dihydro-3-pyridinecarboxylic acids and their derivatives.** Hollos, J.; Eroesne Takacsy, T.; Balogh, M.; Hermecz, I.; Meszaros, Z. (CHINOIN Gyogyszer- es Vegyeszeti Termekek Gyara, Budapest (Hungary)). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32124 (INIS-mf—7497, pp 210-211) **Computer-based retrieval of organic mass spectra. The impact of the composition of the database on the effectiveness of retrievals.** Hollos, J. (CHINOIN Gyogyszer- es Vegyeszeti Termekek Gyara, Budapest (Hungary)). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32125 (INIS-mf—7497, pp 240-241) **Effect of particle-size in the XRF analysis of thin samples.** Holynska, B.; Markowicz, A. (Institute of Physics and Nuclear Techniques, Krakow (Poland)). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32126 (INIS-mf—7497, pp 242-243) **Differential equations of concentration correction in X-ray fluorescence analysis.** Kuczumow, A. (Uniwersytet Marii Curie-Sklodowskiej, Lublin (Poland)). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32127 (INIS-mf—7497, pp 248-249) **Series-analysis of geological samples by X-ray fluorescence spectrometer.** Mueller, N.; Pholiadis, D. (Bundesversuchs- und Forschungsanstalt Arsenal, Wien (Austria). Geotechnisches Institut). 1982. (In German and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32128 (INIS-mf—7497, pp 250-251) **Investigation of engine oil by X-ray fluorescence spectrometry.** Surowska, B.; Klonowiecki, W. (Technical University, Lublin (Poland). Inst. of Mach. Techn. and Expl.). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32129 (INIS-mf—7497, pp 252-253) **Spetroscopic analysis of glide bearings of vehicle motors.** de Sas-Stupnicka, H.; Wrona, J. (Technische Hochschule, Lublin (Poland). Inst. fuer Technologie und Maschinenausnutzung). 1982. (In German and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32130 (INIS-mf—7497, pp 254-255) **X-ray fluorescence analysis of liquid metals.** Andruschik, L.O.; Melnik, B.A. (AN Ukrainskoj SSR, Kiev. Inst. Metallofiziki). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32131 (INIS-mf—7497, pp 256-257) **Application of the XRF spectrometer PW-1600 for the analysis of geochemical samples.** Shevaleevsky, I.D.; Rostshina, I.A. 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32132 (INIS-mf—7497, pp 26a-261) **Determination of light elements by the VRA-20R type X-ray spectrometer of the Zeiss firm.** Ehrhardt, H.; Sanner, G. (VEB Mansfeld Kombinat Wilhelm Pieck, Freiberg (German Democratic Republic). Forschungsinstitut fuer NE-Metalle). 1982. (In German and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32133 (INIS-mf—7497, pp 264-265) **Analytical application of particle-induced X-ray emission (PIXE) in ATOMKI.** Kisa, I.; Koltay, E.; Laszlo, S.; Szabo, G. (Magyar Tudomanyos Akademia, Debrecan. Atommag Kutato Intezete). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32134 (INIS-mf—7497, pp 270-271) **Possibilities and limits of XRF investigations in medicine for diagnostical purposes.** Bacso, J. (Magyar Tudomanyos Akademia, Debrecan. Atommag Kutato Intezete). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32135 (INIS-mf—7497, pp 340-341) **Determination of trace amounts of heavy elements (Pb, Cd, Hg and Fe) in the organs of beeves by X-ray fluorescence spectroscopy.** Popko, R. (Technische Hochschule, Lublin (Poland). Inst. fuer Technol. und Ausnutz. der Masch.). 1982. (In German and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32136 (INIS-mf—7497, pp 342-343) **Determination of heavy metals in milk products by X-ray fluorescence spectrometry.** Surowska, B.; Popko, R. (Technical University, Lublin (Poland). Inst. of Mach. Techn. and Expl.). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32137 (INIS-mf—7497, pp 384-385) **Determination of impurities in different structural materials for the production of material test and research (MTR) reactors.** Goergenyi, T.; Franz, H. (Nuklear-Ingenieur Service G.m.b.H., Hanau (Germany, F.R.)). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32138 (INIS-mf—7497, pp 190-191) **Comparative investigation of laser and spark plasmas from the viewpoint of analytical chemistry.** Matus, L.; Nyary, I.; Frecska, J.; Opauszky, I. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics); Dietze, H.J.; Becker, S. (Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32139 (INIS-mf—7497, pp 246-247) **Possibilities of chemical state determination by applying high resolution X-ray fluorescence spectrometer.** Csikos, C.Z. (Veszpremi Vegyipari Egyetem (Hungary). Asvanytani Tanszek). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32140 (INIS-mf—7498, pp v.9) **Development of a routine non-destructive method for trace analysis of thorium in Israeli geological samples.** Lavi, N.; Lipshitz, G.; Ne'eman, E. (Israel Atomic Energy Commission, Yavne. Soreq Nuclear Research Center:. 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9(Summ)).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

32141 (INIS-mf—7500, pp vp) **Delayed fission neutron counting by ^{3}He-detector during uranium determination with ^{252}Cf-source for irradiation.** Bouda, T.; Kotas, P. (Ceskoslovensky Uranovy Prumysl, Straz pod Ralskem. Ustredni Laboratore:; Florek, M. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. NTIS (US Sales Only), PC A04/MF A01. (CONF-8009295—Absts).

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

32142 (INIS-mf—7500, pp vp) **Analysis of natural radionuclides by the anticoincidence method.** Podracky, P.; Kleps, J.; Cadek, J.; Najmanova, E. (Ceskoslovenska Akademie Ved, Prague. Ustav Geologie a Geotechniky). [nd]. NTIS (US Sales Only), PC A04/MF A01. (CONF-8009295—Absts).

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

32143 (INIS-mf—7550, pp vp) **Determination of nitrogen by neutron activation analysis.** Ivliev, A.I.; Lavrukhina, A.K.; Alekseev, V.A. (AN SSSR, Moscow. Inst. Geokhimii i Analiticheskoj Khimii). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32144 (INIS-mf—7550, pp vp) **High sensitive technique of determination of the contents of the uranium and thorium series of radioisotopes in inorganic scintillators.** Koval'chuk, E.L.; Pomanskij, A.A.; Smol'nikov, A.A. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32145 (INIS-mf—7550, pp vp) **Search for alpha decay of superheavy elements.** Saro, S. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32146 (LA-UR—83-1044) **Infrared-laser spectroscopy, 1980-1983.** McDowell, R.S. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 15p. (CONF-830425—10). NTIS, PC A02/MF A01. Order Number DE83011327.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

The review article used as a text for the Short Course on Infrared Laser Spectroscopy was completed in January 1980 and included only a few references after that date. There has ensued three years of progress, during which spectroscopy using tunable infrared lasers has become an increasingly used tool both for basic research and for analytical and industrial applications. The present paper, which follows closely the outline of the earlier review, updates the latter to early 1983. 238 references.

32147 (LA-UR—83-1223) **Resonant multiphoton ionization for the detection of technetium.** Nogar, N.N.; Miller, C.M.; Downey, S.W.; Sander, R.K. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 6p. (CONF-830425—14). NTIS, PC A02/MF A01. Order Number DE83011178.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

Experiments were carried out to determine optimum wavelengths for the selective ionization of technetium and to estimate the ultimate sensitivity obtainable for resonant ionization mass spectrometry detection of Tc in real samples. Results indicated that the 3099 and 3098 A lines may be analytically useful. The rate of ion production by laser excitation using pulsed lasers and techniques for volatilization of the sample are discussed. (MCG)

32148 (MLM—3061(OP)) **Determination of ^{239}Pu and ^{241}Am in ^{239}Pu by a α-spectrometry.** Kirby, H.W.; Sheehan, W.E. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 1983. Contract AC04-76DP00053. 10p. (CONF-830539—1). NTIS, PC A02/MF A01. Order Number DE83011208.

From International meeting for radionuclide metrology - alpha particle spectrometry and low level measurement; Harwell, UK (10 May 1983).

The α-spectrum tailing function used for the determination of ^{238}Pu/^{239}Pu and ^{241}Pu in plutonium isotopic mixtures is described. The α-ratio of ^{238}Pu to $^{239+240}$Pu is determined from sources purified by anion exchange. The α-ratio of ^{239}Pu + ^{241}Am to $^{239+240}$Pu α-ratio is found by difference and converted to atom parts per million by application of the ^{239}Pu/^{240}Pu isotopic ratio as determined by mass spectrometry. The validity of the method has been verified by analysis of Standard Reference Materials of the US National Bureau of Standards over a period of 5-1/2 years. These analyses enable us to establish the effective purification dates of SRM 946 (10 Apr 70), SRM 947 (26 Sep 70), and SRM 948 (6 Jul 62).

32149 (NP—3901276) **Material and enthalpy balance of chemical processes.** Noeldgen, H. (Dortmund Univ. (Germany, F.R.). Abt. Chemietechnik). 23 Feb 1979. 200p. (In German). NTIS (US Sales Only), MF A01. Order Number DE83901276.

Microfiche only, copy does not permit paper copy reproduction; Thesis.

The multistage mixing-separation extraction plant is treated in connection with a work group who set up a semi-industrial plant to extract acetic acid from an acetic acid/water mixture and to recycle the solvent by distillation. The process data basically free of scattered results by a self set-up measured value balance program, obtained by a test plan, led to the mathematical-statistical model of the extraction process as result of regression analysis.

32150 **Cleaning method and apparatus.** Hollen, R.M.; Jackson, D.D. (to Dept. of Energy). US Patent 4,377,880. 29 Mar 1983. Filed date 27 Feb 1981. vp.

PAT-APPL-239228.

A new automatable cleaning apparatus which makes use of a method of very thoroughly and quickly cleaning a gauze electrode used in chemical analyses is given. The method generates very little waste solution, and this is very important in analyzing radioactive materials, especially in aqueous solutions. The cleaning apparatus can be used in a larger, fully automated controlled potential coulometric apparatus. About 99.98% of a 5 mg plutonium sample was removed in less than 3 minutes, using only about 60 ml of rinse solution and two main rinse steps.

32151 **Radiochemical procedures.** Lyon, W.S. (Oak Ridge National Lab., TN (USA)). *Radiochemical and Radioanalytical Letters;* 53: No. 5-6, 259-262(20 Oct 1982).

Portions are illegible in microfiche products ref.

The modern counting instrumentation has largely obviated the need for separation processes in the radiochemical analysis but problems in low-level radioactivity measurement, environmental-type analyses, and special situations caused in the last years a renaissance of the need for separation techniques. Most of the radiochemical procedures, based on the classic works of the Manhattan Project chemists of the 1940's, were published in the National Nuclear Energy Series (NNES). Improvements such as new solvent extraction and ion exchange separations have been added to these methods throughout the years. Recently the Los Alamos Group have reissued their collected Radiochemical Procedures containing a short summary and review of basic inorganic chemistry - 'Chemistry of the Elements on the Basis of Electronic Configuration'.

32152 **Transport of Eu^{3+} through a Bis(2-ethylhexyl)-phosphoric acid, n-dodecane solid supported liquid membrane.** Danesi, P.R.; Horwitz, E.P.; Rickert, P. (Argonne National Lab., IL). *Separation Science and Technology;* 17: No. 9, 1188-1192(1982). Contract W-31-109-ENG-38.

The coupled transpot of Eu^{3+} and H^+ ions througn a solid supported liquid membrane consisting of a porous polypropylene film immobilizing an HDEHP solution in n-dodecane has been studied as a function of the membrane area, stirring speed of the aqueous solutions, membrane composition, and acidity of the feed solution. The experimental results are in agreement with predictions derived from a theoretical permeability coefficient equation which assumes that membrane diffusion and aqueous film diffusion are the only rate-controlling factors.

4002 Inorganic And Physical Chemistry

REFER ALSO TO CITATION(S) 31092, 31364, 32051, 32139, 32204

32153 **(AD-A—123020/0) Diffuse reflectance Fourier transform infrared spectroscopic study of chemical bonding and hydrothermal stability of an amino silane on metal oxide surfaces. Technical report.** Naviroj, S.; Koenig, J.L.; Ishida, H. (Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Macromolecular Science). 1 Dec 1982. 42p. NTIS, PC A03/MF A01.

Fourier transform infrared spectroscopy is used to study the metal oxide/silane interface. Structures of gamma-aminopropyldimethylethoxysilane (gamma-APDMES) coupling agent on the surface of metal oxide powders are proposed. The structure depends on the surface characteristics of the substrate. The amine group of the silane molecule forms a hydrogen bond with the silica surface. The enhanced intensity of the amine band around 1/71600 C indicates that amine group forms a complex on the titanium and aluminum oxide surfaces as well as hydrogen bond. By using the diffuse reflectance infrared technique, the Al-O-Si and Ti-O-Si antisymmetric frequencies are detected at 963 and 1/950 cm, respectively, which agree favorably with the calculated frequencies. When the treated metal oxide powders are immersed in 80 degrees C water, the desorption of silance is more rapid when aluminum powder, rather than titanium powder, is the substrate. Silica powder, however, forms a more hydrophobic surface. The rate of silane desorption decreased in the order.of aluminum oxide, titanium oxide, and silicon oxide.

32154 (ANL—82-88, pp 44-55) **Optical properties of molecular liquids.** Painter, L.R.; Birkhoff, R.D. (Univ. of Tennessee, Knoxville). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

There is considerable interest in the optical properties of liquids in the vacuum uv region. These properties of the following liquids were studied: water, silicone oils, glycerol, alkanes, polycyclic hydrocarbons, formamide, and hexamethyl phosphorictriamide. 8 figures. (DLC)

32155 **(BNL—32712) Configuration changes in electron-exchange reactions of metal complexes.** Brunschwig, B.S.; Creutz, C.; Sutin, N. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 4p. (CONF-830614—2). NTIS, PC A02/MF A01. Order Number DE83009728.

From 7. DOE solar energy research conference; San Francisco, CA, USA (1 Jun 1983).

Metal-ligand distances were determined for various complexes of Ru, Co, Fe, and Cr. Changes in metal-oxygen or metal-nitrogen bond lengths which occur upon oxidation were alo determined. These changes correlate strongly with electron exchange rates. (DLC)

32156 **(CONF-830427—2) Molecular dynamics study of complexing in molten salts.** Saboungi, M.L.; Blander, M.; Rahman, A. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83010729.

From 1. international symposium on molten salt chemical and technical; Kyoto, Japan (20 Apr 1983).

This paper discusses molecular dynamics calculations of the structures of $MX\text{-}AX_3$ molten mixtures for four different anion/cation radius ratios to determine the properties of a range of different complexing ionic melts having a simple form for the interionic pair potentials. The calculations were performed on about 500 particles with approximately 12,000 time steps for each assemblage. The radius ratios were chosen so that at one extreme the A^{+3} ions were close to six coordination (potentials a and b) and at the other extreme were four coordinated (potentials c and d). We did not attempt to model real melts but rather to understand the detailed physical structures of complexing ionic mixtures. The calculations included radial distribution functions (six for each composition) as well as the angular distributions of selected ion triplets. Results indicate that complexing in ionic systems is not always as simple as is implied in the chemical models used to describe their properties.

32157 **(DOE/ER/10689—3) Reactions of metal ions and their clusters in the gas phase using laser ionization - ion cyclotron resonance spectroscopy. Progress report July 1, 1982-June 30, 1983.** Freiser, B.S. (Purdue Univ., Lafayette, IN (USA). Dept. of Chemistry). Mar 1983. Contract AC02-80ER10689. 19p. NTIS, PC A02/MF A01. Order Number DE83011440.

Progress was made in the study of metal-ion chemistry in the gas phase using the combined laser desorption-ion cyclotron resonance technique. The goals of this work have been 3-fold: determination of fundamental reaction mechanisms and trends in reactivity; comparison of gas phase to solution phase results; and development of metal ions as selective chemical ionization reagents. In this report the focus is specifically on the first of these objectives in summarizing the findings of a series of papers to the Journal of the American Chemical Society on the structures of MC/sub n/H/sub 2n/$^+$ ions (M = Fe, Co, Ni; n = 3 to 7). All three metal ions dehydrogenate linear alkanes via initial insertion into C-C bonds. In contrast to Ni^+, both Fe^+ and Co^+ dehydrogenate linear alkanes also via initial insertion into C-H bonds. These differences may be explained on the basis of thermochemistry.

32158 (INIS-mf—7497, pp 208-209) **Mass-spectrometric investigation of the evaporation properties of DyI_3 and mixed DyI_3/NaI and DyI_3/CsI systems.** Lelik, L.; Balthazarne Vass, K.; Kaposi, O. (Eoetvoes Lorand Tudomanyegyetem, Budapest (Hungary). Fizikai Kemiai es Radiologiai Tanszek). 1982. (In Hungarian and English). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32159 (INIS-mf—7497, pp 302-303) **Catalytic intermediates studied by ESR.** Stasko, A.; Tkac, A.; Malik, L. (Slovenska Vysoka Skola Technicka, Bratislava (Czechoslovakia)). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32160 **(LBL—11377) Reaction of hydrogen sulfide with oxygen in the presence of sulfite.** Weres, O.; Tsao, L. (Lawrence Berkeley Lab., CA (USA)). 14 Jan 1983. Contract AC03-76SF00098. 84p. NTIS, PC A05/MF A01. Order Number DE83011132.

Commonly, abatement of hydrogen sulfide emission from a geothermal powerplant requires that hydrogen sulfide dissolved in the cooling water be eliminated by chemical reaction. Oxidation by atmospheric oxygen is the preferred reaction, but requires a suitable catalyst. Nickel is the most potent and thereby cheapest catalyst for this purpose. One mg/L nickel in the cooling water would allow 99% removal of hydrogen sulfide to be attained. A major drawback of catalytic air oxidation is that colloidal sulfur is a major reaction product; this causes rapid sludge accumulation and deposition of sulfur scale. We studied the kinetics and product distribution

of the reaction of hydrogen sulfide with oxygen, catalyzed by nickel. Adding sodium sulfite to the solution completely suppresses formation of colloidal sulfur by converting it to thiosulfate. The oxidation reaction is an autocatalytic, free radical chain reaction. A rate expression for this reaction and a detailed reaction mechanism were developed. Nickel catalyzes the chain initiation step, and polysulfidoradical ions propagate the chains. Several complexes of iron and cobalt were also studied. Iron citrate and iron N-hydroxyEDTA are the most effective iron based catalysts. Uncomplexed cobalt is as effective as nickel, but forms a precipitate of cobalt oxysulfide and is too expensive for practical use. 33 figures, 9 tables.

32161 **(NP—3901190) Evaluation of kinetic effects observed in resistivity measurements and calorimetric measurements of sorption systems.** Pluntke, C. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Fachbereich Mathematik und Physik). 26 Oct 1979. 105p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901190.

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The influence of heat conduction effects on the sorption temperature dependence at higher gas pressures has been reduced essentially by geometrical modifications of the calorimeters used. As a result adsorption heat measurements are now feasible at 273 K in the vicinity of a monolayer ($p = 10^{-3} - 10^{-2}$ Pa). Using an improved evaluation model, the deviations of the temperature dependence in the case of sorption relative to calibration measurements can be obtained quantitatively. In addition this model gives a qualitative description of the different resistivity characteristics.

32162 **(RFP—3478) Compendium of fluorine data.** Detamore, J.A. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 16 Apr 1983. Contract AC04-76DP03533. 24p. NTIS, PC A02/MF A01. Order Number DE83011152.

Research was conducted to locate information about fluorine. This information includes chemical and physical properties of fluorine, physiological effects produced by the material, first-aid, personnel and facility protection, and materials of construction required when handling fluorine in piping and process vessels. The results of this research have been compiled in this report.

32163 **Structural consequences of oxidation in photosynthetic models. Crystal structure of (perchlorato)-(5,10,15,20-tetraphenylporphinato)magnesium(II).** Barkigia, K.M. (Brookhaven National Lab., Upton, NY); Spaulding, L.D.; Fajer, J. *Inorganic Chemistry;* **22**: No. 2, 349-351(19 Jan 1983). Contract AC02-76CH00016.

This report is an X-ray determination of a magnesium porphyrin radical, (perchlorato)(5,10,15,20-tetraphenylporphinato)magnesium(II), $MgTPP^{+}.ClO_4^{-}$ as a model of the structural and stereochemical consequences of the loss of an electron in photosynthetic chromophores.

32164 **Equilibrium and transient study of adsorption of pyridine on silver in an electrolytic solution.** Chen, C.K.; (Univ. of California, Berkeley); Heinz, T.F.; Ricard, D.; Shen, Y.R. *Chemical Physics Letters;* **83**: No. 3, 455-458(1 Nov 1981). Contract W-7405-ENG-48.

Surface-enhanced second-harmonic generation and surface-enhanced Raman scattering are used to study the adsorption of pyridine on silver in an electrolytic solution. The observed adsorption isotherms can be approximated by Langmuir curves, but the transient behaviors are difficult to understand. 3 figures.

32165 **Quasiperiodic and stochastic behavior in molecules.** Noid, D.W. (Oak Ridge National Lab., TN); Koszykowski, M.L.; Marcus, R.A. *Annual Review of Physical Chemistry;* **32**: 267-309(1981).

Recent theoretical studies on the quasiperiodic and chaotic dynamical aspects of vibrational states are reviewed with 198 references published primarily prior to December 1980 being cited. In the first part of the article, the classical mechanical developments in anharmonic systems are reviewed with various ways in which regular and chaotic motion is usually detected numerically being summarized. Questions of possible analogous semiclassical and quantum mechanical behavior are addressed in the second and third parts. A review of related work on spectral properties, including calculation of classical power spectrum from a classical trajectory, a comparison with the aid of semiclassical ideas with the quantum mechanical power spectrum of the same variable, and some discussion of local versus nonlocal modes of vibration, is contained in the fourth part of the article. (BLM)

4003 Organic Chemistry

REFER ALSO TO CITATION(S) 31179, 31192, 31193, 31200, 31367, 32157, 32159, 32161, 32164

32166 **(DOE/ER/10938—2) Short-cut procedures for the simultaneous design of a process and its control system. Progress report, April 16, 1982-April 15, 1983.** Douglas, J.M.; Malone, M.F. (Massachusetts Univ., Amherst (USA)). 15 Apr 1983. Contract AC02-81ER10938. 44p. NTIS, PC A03/MF A01. Order Number DE83010994.

Previous studies on heat-exchangers networks and sequences of separation systems have assumed that the process flow rates were fixed, but it is shown that the optimum flows depend on the heat-exchanger network and the separation system chosen. A procedure for controlling these complex processes has been developed and a short-cut method is described for assessing the incremental costs associated with control at the preliminary design stage. In order to simplify the analysis, we have developed very simple approximate solutions of Underwood's equations for the minimum reflux ratios (which are used to find the vapor rates). The approximate solutions can be used to develop very simple quantitative criteria for deciding whether the direct or indirect separation sequence is the cheapest. The simplified solution of Underwood's equation can also be used to develop short-cut design procedures for complex distillation columns, i.e., sidestreams, prefractionators, sidestream strippers and reboilers, etc. An expression for the maximum purity of the sidestream composition has been derived and some results have been obtained for prefractionators.

32167 **(INIS-mf—7513) Investigation of phase transitions in solid methane and deuterated derivatives to pressures of 3 kbar.** Sprik, M. (Amsterdam Univ. (Netherlands)). 28 Apr 1982. 151p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83780438.

Thesis.

The first part of this thesis is an experimental investigation of the interaction responsible for the I-II transition and the second part comprises three theoretical studies of several of the properties of phase I and II. The first chapter of part I, is a general introduction to a thermodynamic treatment of the isotope effect in an orientational phase transition. The thermodynamic approach yields a corresponding state model for the phase diagrams of the five isotopes of methane (CH_4, CHD_3, CH_2D_2, CH_3D and CD_4). In the remaining two chapters of part I, the corresponding state relation mentioned above is applied to the I-II transition of methane in order to obtain an experimental value for the effective exponent n of the dependence on intermolecular separation of the ordering anisotropic interaction. Part II starts with a derivation of a quasi-classical approximation to the statistical density matrix of a free spherical top. While the orientational system is treated classically, the consequences of the other characteristic of the methane molecules are considered, i.e. the high approximately odd symmetry of the molecule (the octupole field in phase II is odd under spatial inversion). It is argued that the renormalization group analysis of critical phenomena in certain highly complicated antiferromagnetic systems may be equally well applied to the I-II transition in methane. Finally, the study of the quantum effect in phase II is resumed. The spin lattice relaxation time at very low temperature is calculated from first principles using an orientational dynamical process of purely quantum-mechanical nature.

32168 **(LA-UR—83-1024) Coherent Raman scattering measurements of vibrational frequency shifts in shock-compressed organic liquids.** Moore, D.S.; Schmidt, S.C.; Schiferl, D.; Shaner, J.W. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 6p. (CONF-830425—11). NTIS, PC A02/MF A01. Order Number DE83011331.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

The techniques of backward stimulated Raman scattering (BSRS) and reflected broad-band coherent anti-Stokes Raman scattering (RBBCARS) have been used to measure vibrational frequency shifts in shock-compressed liquid benzene and mixtures of liquid benzene and liquid deuterated benzene. BSRS was used only for measurements in neat liquid benzene as it only allows observation of the highest gain vibrational transition. RBBCARS was used to simultaneously measure multiple vibrational modes of multiple species. Accompanying static high pressure Raman experiments in a heated diamond anvil cell were used to establish the phase of the shocked samples. These experiments demonstrate the capabilities of fast nonlinear optical techniques in the study of material structure and chemical reaction induced by shock-compression.

32169 **(NP—3901279) UV-absorption spectra of chlorine-fluorine derivatives of methane and ethane and of di-nitrogen monoxide in the wavelength region 160-375 nm at temperatures between 208-298 K and their spectroscopic interpretation.** Hubrich, C. (Bochum Univ. (Germany, F.R.). Abt. Chemie). 11 Dec 1979. 220p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83901279.

Thesis.

In this paper a simple set-up is described for the measurement of UV-absorption spectra in the wavelength-region above 160 nm as a function of temperature. Using this apparatus, absorption spectra have been recorded between 160 nm and 375 nm in the temperature range 208-298 K for the following systems: CCl_4, $CHCl_3$, CCl_3F, CH_2Cl_2, $CHCl_2F$, CCl_2F_2, CH_3Cl, CH_3ClF, $CHClF_2$, CCl_3F, CCl_2F-$CClF_2$, $CClF_2$-$CClF_2$, CF_3-$CClF_2$, CF_3-CH_2Cl, CH_3-CCl_3, CH_3-$CClF_2$, CH_3-CH_2Cl and N_2O. At 200 nm variation of the temperature by $\Delta T = 90$ K results in a 62% ($CHCl_2F$) to 12% (CH_3-$CClF_2$) decrease of the absorption cross-section relative to the room temperature values. The absorption spectra are compared with results of more recent publications. In photolysis experiments at 253.7 nm, the absorption cross-sections of $CHCl_3$ (3.5×10^{-23} cm^3) and CCl_3F (2.8×10^{-23} cm^3) are determined using nitric oxide as radical catcher. At wavelengths of 208 nm to 375 nm, the method yields a total absorption cross-section of CCl_3F of sigmasub(280-375 nm) $< 10^{-26}$ cm^2.

32170 **Synthesis of alpha-amino acids.** Davis, J.W. (to Dept. of Energy). US Patent 4,375,555. 1 Mar 1983. Filed date 29 Jun 1981. vp.

PAT-APPL-278102.

A method is described for synthesizing alpha amino acids proceeding through novel intermediates of the formulas: R_1R_3C(OSOCl)C/sub n/, R_1R_3C(Cl)C/sub n/ and (R_1R_3C(C/sub n/)O)2SO wherein R_1 and R_3 are each selected from hydrogen monovalent substituted and unsubstituted hydrocarbon radicals of 1 to 12 carbon atoms. The use of these intermediates allows the synthesis steps to be exothermic and results in an overall synthesis method which is faster than the synthesis methods of the prior art.

32171 **Kinetics of the reduction of pyridinium ions by 2-hydroxy-2-propyl radicals in aqueous solution.** Shimura, M.; Espenson, J.H. (Iowa State Univ., Ames). *Inorganic Chemistry;* **22**: No. 2, 334-337(19 Jan 1983). Contract W-7405-ENG-82.

Kinetic measurements were made for the reductions of the pyridinium ions derived from pyridine, 4-methylpyridine, 3-hydroxypyridine, nicotinamide, and isonicotinamide as well as 1-methylpyridinium and 1,4-dimethylpyridinium ions by 2-hydroxy-2-propyl radicals, which were generated by the homolytic cleavage of the chromium-carbon bond in $(H_2O)_5CrC(CH_3)_2OH^{2+}$. The rate constants (dm^3 mol^{-1} s^{-1}) at 25.0°C and an ionic strength of 1.0M ($LiClO_4$) are as follows: pyridinium ion, 9.6×10^6; 1-methylpyridinium ion, 3.7×10^6; 4-methylpyridinium ion, 7.3×10^4; 1,4-dimethylpyridinium ion, $\leq 1 \times 10^4$; 3-hydroxypyridinium ion, 1.4×10^6; 3-(aminocarbonyl)pyridinium ion, 7.9×10^6; 4-(aminocarbonyl)pyridinium ion, 1.2×10^9. The rate constants are reasonably well correlated by the Hammett p-σ equation with $\rho = +8.5$. The first two compounds show a second kinetic term corresponding to the rate law $k'[Cr^{2+}][pyH^+][.C(CH_3)_2OH][H^+]^{-1}$, consistent with reduction of a Cr(II)-pyridine complex by the free radical.

32172 **Fluoranthene: synthesis and mutagenicity of four diol epoxides.** Rastetter, W.H. (Massachusetts Inst. of Tech., Cambridge); Nachbar, R.B. Jr.; Russo-Rodriquez, S.; Wattley, R.V.; Thilly, W.G.; Andon, B.M.; Jorgensen, W.L.; Ibrahim, M. *Journal of Organic Chemistry;* **47**: No. 25, 4873-4878(3 Dec 1982). Contract AC02-77EV04267.

The syntheses of diol epoxides of the mutagenic hydrocarbon fluoranthene are described. Standard methodology is applied to the synthesis or targets, but fails for the synthesis of some targets. It has been shown that, two diol epoxides can be assembled by a route utilizing stereoselective, directed epoxidations. Simple molecular orbital calculations have been used to predict the reactivity of the diol epoxides in their opening to triol carbocations. Specific diol epoxides are predicted to be substantially more reactive than their isomers. A more reactive pair of diol epoxides may yield carbocations capable of alkylating cellular genetic material. This prediction is borne out in terms of the relative mutagenicity of the diol epoxides in a bacterial screen. The syntheses and mutation assay of six possible metabolites of fluoranthene (dihydrodiols and diol epoxides) are discussed in this report.

32173 **Thermal unimolecular decomposition of bicyclopropyl and deuterated analogues: infrared photoactivation as a diagnostic tool in mechanistic organic chemistry.** Farneth, W.E. (Univ. of Minneapolis, MN.); Thomsen, M.W. *Journal of Organic Chemistry;* **47**: No. 25, 4851-4855(3 Dec 1982). Contract AC02-80ER10592.

The infrared photochemistry of bicyclopropyl yields product mixtures that are not easily rationalized on the basis of the mechanistic scheme suggested by previous pyrolysis work. As a result of this inconsistency the thermal chemistry of bicyclopropyl and analogues deuterated specifically on one ring has been reexamined. A significant new reaction channel involving the chemically activated decomposition of cyclohexene to ethylene and butadiene has been demonstrated. Evidence for the involvement of chemically activated cyclohexene is as follows: (1) isotopic labeling studies implying a symmetric intermediate, (2) a pressure-dependent ratio of cyclohexene to butadiene and ethylene, (3) good agreement between experimental and calculated values for the unimolecular rate constant for retro-Diels-Alder decay of "hot" cyclohexene. A comprehensive mechanism for the unimolecular decay of bicyclopropyl is proposed. The important elements of this mechanism are a single first-formed 1,3 biradical common to all products and the intervention of chemical activation in the generation of several of the secondary products.

32174 **Phosphorus-31 and carbon-13 nuclear magnetic resonance studies of divalent cation binding to phosphatidylserine membranes: use of cobalt as a paramagnetic probe.** McLaughlin, A.C. (Brookhaven National Lab., Upton, NY). *Biochemistry;* **21**: No. 20, 4879-4885(28 Sep 1982).

The paramagnetic divalent cation cobalt has large and well-understood effects on NMR signals from ligands bound in the first coordination sphere, i.e., inner-sphere ligands, and we have used these effects to identify divalent cation binding sites at the surface of phosphatidylserine membranes. ^{31}P NMR results show that 13% of the bound cobalt ions are involved in inner-sphere complexes with the phosphodiester group, while ^{13}C NMR results show that 54% of the bound cobalt ions are involved in unidentate inner sphere complexes with the carboxyl group. No evidence is found for cobalt binding to the carbonyl groups, but proton release studies suggest that 32% of the bound cobalt ions are involved in chelate complexes that contain both the carboxyl and the amine groups. All (i.e., 13% + 54% + 32% = 99%) of the bound cobalt ions can thus be accounted for in terms of inner sphere complexes with the phosphodiester group or the carboxyl group. We suggest

that the unidentate inner-sphere complex between cobalt and the carboxyl group of phosphatidylserine and the inner-sphere complex between cobalt and the phosphodiester group of phosphatidylserine provide reasonable models for complexes between alkaline earth cations and phosphatidylserine membranes.

32175 **Thermodynamic model for excess-electron energy and drift transport in liquid alkanes.** Hamill, W.H. (Univ. of Notre Dame, IN). *Journal of Physical Chemistry;* **85**: No. 14, 2071-2074(1981).

Electrons in liquid alkanes exhibit striking regularities between the electron energy V_0 (in the quasi-free state e/sub f/$^-$, relative to vacuum), the drift mobility μ and its activation energy E/sub a/, the dependence of V_0 on composition in binary mixtures, and the frequently very large negative value of dV_0/dT identical with β. Experimentally, U/sub p/ + $T_0 = V_0 + \beta T$ for e/sub f/$^-$. For several alkanes the average value of $V_0 + \beta T$ is -0.74 +- 0.003 eV at 296 K. In terms of the hopping transport model the activation free energy is $\alpha(V_0$ - V/sub 0t/) where V/sub 0t/ is the energy of the trapped electron e/sub t/$^-$, also relative to vacuum, and $0 < \alpha < 1$. The observed regularities require that $\alpha \simeq 0.38$ at 296 K for the alkanes. Identification of V_0 with the free energy difference for e/sub vac/$^- \rightarrow$ e/sub f/$^-$ leads to $\beta = \Delta S_0$ and similarly $\gamma = \Delta S$/sub 0t/ for V/sub 0t/. This is qualitatively consistent with entropy changes for thermal electron detachment from anions in alkanes to produce e/sub t/$^-$. The necessity of considering an entropy of activation ΔS/sub a/ affects the interpretation $\mu_0 \simeq 150$ $cm^2\ V^{-1}\ s^{-1}$ in $\mu = \mu_0$ exp(-E/sub a//kT). In mixtures of very unlike alkanes, E/sub a/ may vanish in a range of composition of ΔS/sub a/ remain positive and linear in composition, as in methane-ethane. Over a wide range of temperature V_0 may minimize, as in neopentane, and $dV_0/dT = 0$ leads to ΔS/sub a/ = 0 at a minimum coincident with μ/sub max/.

32176 **Synthesis of some substituted difluoronitroacetanilides and their reduction to substituted N-difluoronitroethylanilines.** Bissell, E.R.; Swansiger, R.W. (Lawrence Livermore National Lab., CA). *Journal of Fluorine Chemistry;* **17**: 485-487(1981). Contract W-7405-ENG-48.

The synthesis of difluoronitroacetanilide and its p-methyl and m-methoxyl derivatives and their reduction by diborane in tetrahydrofuran to the corresponding N-difluoronitroethylanilines is described. Yields on the acetanilides ranged from 13 to 43% and on the anilines from 50 to 64%.

4004 Electrochemistry

REFER ALSO TO CITATION(S) 32045, 32164

32177 **(CONF-810203—19) Activity coefficients of lithium dilute in binary alloys: measurements and calculations.** Saboungi, M.L.; Marr, J.; Spineto, S. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83010586.

From AIME annual meeting; Chicago, IL, USA (22 Feb 1981).

Electromotive force measurements of the activity of lithium dilute in three binary solvents (Al-Sn, Tl-Bi, and Bi-Pb) have been carried out at constant temperature. The variations of the activity coefficients of Li as a function of the composition of the solvent are analyzed in terms of three different models, the quasi-chemical theory, the Wagner model, and the coordination cluster theory. This last model appears to provide an excellent interpretation of the experimental results. 4 figures.

32178 (INIS-mf—7497, pp 386-387) **Study of plastic-bounded electrodes by isotopic labelling.** Toth, J.; Hazi, E. (Veszpremi Vegyipari Egyetem (Hungary). Radiokemiai Tanszek); Prokai, L. (Magyar Asvanyolaj es Foeldgaz Kiserleti Intezet, Veszprem). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

4005 Photochemistry

REFER ALSO TO CITATION(S) 31377, 32164, 32169

32179 **(DOE/ER/10606—T1) Internal energy distribution of the parent molecule and its photofragments following ir multiphoton absorption. Final scientific report, April 1, 1981-September 30, 1982.** Zare, R.N. (Stanford Univ., CA (USA). Dept. of Chemistry). 1982. Contract AT03-80ER10606. 10p. NTIS, PC A02/MF A01. Order Number DE83010997.

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The internal energy distributions of the C_2 and CN fragments formed during the Infrared Multiphoton dissociation (IRMPD) of vinyl cyanide (CH_2 = CHCN) have been observed using the technique of laser-induced fluorescence. These experiments were performed using either a molecular beam or low-pressure flowing gas of the vinyl cyanide parent molecule. By varying the time delay between the CO_2 laser pulse and dye laser probe, the dependence of both the C_2 and CN fragment energy on the effective laser intensity was investigated. A plasma shutter was used to remove the less intense tail of the CO_2 laser pulse without otherwise modifying the laser output. It was found that variations in the pulse intensity distribution control the rotational distribution of CN fragments formed in the photolysis of vinyl cyanide.

32180 **(DOE/ER/10755—2) Unimolecular dynamics of internal energy selected molecules. Technical progress report.** (Wisconsin Univ., Madison (USA). Dept. of Chemistry). 1983. Contract AC02-80ER10755. 11p. NTIS, PC A02/MF A01. Order Number DE83011372.

Experimental studies of unimolecular reaction dynamics using direct excitation of overtone vibrations in combination with time-resolved spectroscopic product detection provide detailed data on unimolecular decomposition rates and energy disposal into the fragments of selectivity excited molecules. We have measured the reaction rate of tetramethyldioxetane at several energies using chemiluminescence detection and have constructed a pulsed molecular-beam apparatus for extending these measurements to cold molecules. We have also used laser-induced fluorescence detection to measure the unimolecular decay rate in selectivity excited t-butylhydrperoxide and to determine the product quantum states populated in the decompisition of hydrogen peroxide and its partially deuterated analogue. 3 figures.

32181 **Electron spin resonance and electron spin-echo studies of the photoionization of tetramethylbenzidine in frozen aqueous anionic, cationic, and nonionic micellar solutions. Effect of micelle type and anionic micelle size.** Narayana, P.A.; Li, A.S.W.; Kevan, L. (Univ. of Houston, TX). *Journal of the American Chemical Society;* **104**: No. 24, 6502-6505(1 Dec 1982). Contract AS05-80ER10745.

Electron spin resonance (ESR) and electron spin-echo studies of the photoionization of N,N,N',N'-tetramethylbenzidine (TBM) to give the cation radical have been carried out in anionic (sodium octyl sulfate (S8S), sodium decyl sulfate (S10S), sodium dodecyl sulfate (S12S), and sodium tetradecyl sulfate (S14S)), cationic (dodecyltrimethylammonium chloride (DTAC) and hexadecyltrimethylammonium chloride (HTAC)), and nonionic (Triton X-100) micellar solutions frozen to 77 K. Cation-water interactions have been detected by electron spin-echo modulation (ESEM) analysis and are found to increase with decreasing alkyl chain length in anionic micelles. This is interpreted as consistent with an asymmetric solubilization site for the cation near the micellar surface and with little water penetration into the micelle. The photoionization efficiency in anionic micelles correlates with increased cation-water interactions. In cationic micelles the photoionization is about two-fold more efficient than in anionic micelles of the same alkyl chain length, although the cation-water interaction is less. The overall photoionization efficiency of a micellized solute appears to depend on micellar surface charge as well as on solute location within the micelle.

32182 **Metallopolymer photochemistry. Photophysical, photochemical, and photoelectrochemical properties of (bpy)$_2$Ru/sup II/ < sites bound to poly(4-vinylpyridine).** Calvert, J.M.; Caspar, J.V.; Binstead, R.A.; Westmoreland, T.D.; Meyer, T.J. (Univ. of North Carolina, Chapel Hill). *Journal of the American Chemical Society;* **104**: No. 24, 6620-6627(1 Dec 1982). Contract AS05-78ER06034.

The photochemical and photophysical properties of the polymer-bound chromophore $Ru(bpy)_3(PVP)_2^{2+}$ (PVP is poly(4-vinylpyridine)) have been investigated in homogeneous solution. Results have been obtained with polymers both dilute and concentrated in chromophore. Lifetime and quantum yield data are interpreted in terms of models of excited-state behavior previously proposed for analogous monomeric poly(pyridyl) complexes of Ru(II). Excited-state sites within the metallopolymers undergo oxidative and reductive electron-transfer quenching. The quenching reactions were investigated by Stern-Volmer quenching and conventional microsecond flash photolysis. Sensitization of n-TiO_2 to visible light has been observed on a semiconductor coated with a film of the metallopolymer.

4006 Radiation Chemistry

REFER ALSO TO CITATION(S) 32110

32183 **(ANL—82-88) Workshop on the interface between radiation chemistry and radiation physics.** (Argonne National Lab., IL (USA)). Mar 1983. Contract W-31-109-ENG-38. 159p. (CONF-820998—). NTIS, PC A08/MF A01. Order Number DE83010693.

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

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Twenty-four papers are grouped under the session headings: measurements of physical and chemical properties, track structure modeling, spurs and track structure, and the 10^{-16} to 10^{-12} second region. Separate abstracts were prepared for 12 of the papers; four of the remaining papers had previously been abstracted. (DLC)

32184 (ANL—82-88, pp 9-31) **Several interfaces between radiation physics and chemistry that could pleasure each other more.** Freeman, G.R. (Univ. of Alberta, Edmonton). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

This paper offers an overview of currently active areas in Radiation Chemistry that may be pertinent to what Radiation Physicists can calculate. It begins with an overlapping topic, the nonhomogeneous kinetics of reactions in spurs followed by electron thermalization distances and thermal electron mobilities in fluids, electron scattering in gases, and finally, a possible new approach to calculating the energies and shapes of the optical absorption bands of solvated electrons. 18 figures, 2 tables.

32185 (ANL—82-88, pp 37-39) **Excitation processes in irradiated aqueous solutions.** Hart, E.J. Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

Bromate, perchlorate and formate ions are examples of species that dissociate into products not obtained by their reaction with e/sub aq/$^-$, H or OH. O(^{3}P), CO and quantum yields have been used to assess the relative importance of ionization and excitation processes in irradiated solutions.

32186 (ANL—82-88, pp 40-43) **Range and linear ionization rates of low energy electrons.** Meisels, G.G.; Fujii, T. (Univ. of Nebraska, Lincoln). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—). Contract AC02-76ER02567.

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

A semiempirical method for estimating the range of low energy electrons (100 to 600 eV) in water vapor using measurements in other gases has been developed and suggests that ranges are near the upper limit of earlier theoretical estimates.

32187 (ANL—82-88, pp 65-72) **Spatial aspects of radiological physics and chemistry.** Green, A.E.S.; Rio, D.E. (Univ. of Florida, Gainesville). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—). Contract AS05-76EV03798.

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

The spatial distributions of the early time yields of electrons, ions, excited atoms and molecules which follow deposition of low energy electrons in H_2O vapor are first calculated using the spatial yield spectra methodology. These are used as source functions for the calculation of the effects of diffusion and kinetics upon the final distributions of neutral products.

32188 (ANL—82-88, pp 82-90) **Recent calculations modeling data from the pulse radiolysis and gamma radiolysis of water and aqueous solutions.** Trumbore, C.N.; Youngblade, W. (Univ. of Delaware, Newark). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

A model employing a spur overlap feature, an electron probability distribution which is displaced away from the center of the spur, and high and low spur density regions has been used to fit, within experimental error, hydrated electron decay data and the Fricke dosimeter $G(Fe^{3+})$ value from studies on the pulse radiolysis of pure water and aqueous solutions. The radiation source employed to obtain the pulse radiolysis electron decay data used in these studies was the Argonne 14 MeV Linac Accelerator. When the same model is used to predict yields from cobalt 60 gamma radiolysis experiments, there is quantitative agreement at low solute concentrations. At high solute concentrations, molecular product yields are not predicted as accurately. 5 figures.

32189 (ANL—82-88, pp 113-119) **Computational details of the Monte Carlo simulation of proton and electron tracks.** Zaider, M. (Columbia Univ., New York, NY); Brenner, D.J. Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

The code PROTON simulates the elastic and nonelastic interactions of protons and electrons in water vapor. In this paper, the treatment of elastic angular scattering of electrons as utilized in PROTON is described and compared with alternate formalisms. The sensitivity of the calculation to different treatments of this process is examined in terms of proximity functions of energy deposition. 5 figures.

32190 (ANL—82-88, pp 121-122) **Tracks, spurs, blobs and delta-rays.** Magee, J.L.; Chatterjee, A. (Lawrence Berkeley Lab., CA). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

The track of a high-energy particle is the collection of all transient species created by the particle in the total degradation of its energy. Visible electron tracks are called delta rays. A microscopic description of the track with all its knocked-out electrons leads to spurs, blobs, and short tracks. Energy deposition criteria for these three track entities are 6 to 100 eV, 100 to 500 eV, and 500 eV to 5 keV, respectively. (DLC)

32191 (ANL—82-88, pp 123-125) **What is a spur.** Trumbore, C.N. Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

The definition of spur is an operational one, arising from the unique shape of a radiation chemical yield vs log scavenger concentration curve. The spurs in a figure can be seen as localized clusters of intermediates. (DLC)

32192 (ANL—82-88, pp 138-140) **How radiation chemistry can help understand primary processes in the energy deposition process.** Jonah, C.D. (Argonne National Lab., IL). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

One uncertainty in the pre-chemical period is the travel of the electron prior to thermalization. It is shown that radiation chemistry, while unable to determine the distribution of ions, can act as a sensitive test for distributions. Chemical evolution in the pre-chemical times may also be inferred. (DLC)

32193 (ANL—82-88, pp 141-142) **Is the Fricke dosimeter a 1-hit detector.** Katz, R. (Univ. of Nebraska, Lincoln). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

Track theory is used to deal with the response of the Fricke dosimeter to heavy ions. The ratio of G values for normal and pulsed irradiations is plotted against the dose per pulse and compared to the predictions of the 1-hit model. (DLC)

32194 (INIS-mf—7497, pp 388-389) **Fluorescence spectroscopy of aromatic amino acids after cobalt-60 gamma irradiation.** Kurtkaya, E.; Ehrl, A. (Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.)). 1982. (In German and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32195 **Polymers grafted under ionizing radiation - desorption programme for fertilizers.** Berthet, J.; Blin, M.F.; Gaussens, G.; Noaillac, J.R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Office des Rayonnements Ionisants). pp 122 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/20P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32196 **Radiation-initiated grafting on semi-crystalline polymers for membrane preparation.** Ellinghorst, G.; Vierkotten, D.; Niemoeller, A. (Koeln Univ. (Germany, F.R.). Inst. fuer Physikalische Chemie); Fuehrer, J. (Denso-Chemie Wedekind KG, Leverkusen, Germany, F.R.). pp 127 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/32P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32197 **Some applications of ionizing radiations in Czech industry.** Zahalka, J. (Institute for Research, Production and Applications of Radionuclides, Prague, Czechoslovakia). pp 536 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/10P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

4007 Radiochemistry And Nuclear Chemistry

REFER ALSO TO CITATION(S) 31323, 32151, 32529, 32628

32198 (CONF-820804—5) **Isotopic generator for ^{212}Pb and ^{212}Bi.** Zucchini, G.L.; Friedman, A.M. (Ferrara Univ. (Italy); Argonne National Lab., IL (USA); Chicago Univ., IL (USA)). 1982. Contract W-31-109-ENG-38. 2p. NTIS, PC A02/MF A01. Order Number DE83010794.

From 3. world congress of nuclear medicine and biology; Paris, France (29 Aug 1982).

A large potential exists for the use of short lived alpha emitting isotopes for therapeutic purposes. Most prior research has been performed with isotopes such as ^{211}At which require a cyclotron for production. It obviously would be more convenient to use a long lived isotopic generator system. For this reason, we have undertaken a study of the properties of several such generators, one of which, ^{228}Th, is described here.

32199 (CONF-830419—3) **5f state interaction with inner coordination sphere ligands: einsteinium 3+ ion fluorescence in aqueous and organic phases.** Beitz, J.V.; Wester, D.W.; Williams, C.W. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 21p. NTIS, PC A02/MF A01. Order Number DE83010723.

From 16. rare earth research conference; Tallahassee, FL, USA (18 Apr 1983).

The interaction between 5f electron states of einsteinium 3+ ion and coordinated ligands in solution has been probed using laser-induced fluorescence. Aquo einsteinium 3+ ion was observed to fluoresce from its first excited J = 5 state in a broad-band peaking at 9260 wavenumbers. The observed fluorescence lifetimes were 1.05 microseconds and 2.78 microseconds in H_2O and D_2O (99+ % D atom), respectively. The non-radiative decay rates derived from the lifetime data are compared with previously reported data for Cm, Sm, Eu, Tb, and Dy aquo 3+ ions. The 5f actinide states exhibit substantially greater non-radiative decay rates than do lanthanide 4f states of similar energy gap. This provides evidence that actinide 5f electrons interact more strongly with their inner coordination sphere than do lanthanide ion 4f electrons. The fluorescence lifetime of einsteinium 3+ ion complexed with 1 formal di(2-ethylhexyl)orthophosphoric acid in h-heptane was 2.34 microseconds. 3 figures, 1 table.

32200 (INIS-mf—7497, pp 294-295) **Investigation of complexes of octaethyltetraamido pyrophosphate (OETAPP) with uranyl salts using infrared spectroscopy.** Grychowski, P.; Mikulski, J. (Institute of Nuclear Physics, Krakow (Poland)); Moravec, J.; Sara, V.; Sourkova, L. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky). 1982. (In English and Hungarian). NTIS (US Sales Only), PC A18/MF A01. (CONF-8206128—Summ).

From 7. conference on analytical atomic spectroscopy and 25. Hungarian annual conference on spectral analytical analysis; Sopron, Hungary (14 Jun 1982).

32201 (INIS-mf—7550, pp vp) **Physical and chemical aspects of the search for superheavy elements in nature.** Flerov, G.N.; Ter-Akopian, G.M.; Skobelev, N.K. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32202 (INIS-mf—7550, pp vp) **Isotope enrichment and ion counting of radiocarbon.** Hedges, R.E.M. (Oxford Univ. (UK). Research Lab. for Archaeology). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32203 (K/PS—352) **Thermodynamic data for uranium fluorides.** Leitnaker, J.M. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). Mar 1983. Contract W-7405-ENG-26. 39p. NTIS, PC A03/MF A01. Order Number DE83011049.

Self-consistent thermodynamic data have been tabulated for uranium fluorides between UF_4 and UF_6, including UF_4 (solid and gas), U_4F_{17} (solid), U_2F_9 (solid), UF_5 (solid and gas), U_2F_{10} (gas), and UF_6 (solid, liquid, and gas). Included are thermal function - the heat capacity, enthalpy, and free energy function, heats of formation, and vaporization behavior.

32204 **Synthesis and crystal and molecular structure of bis(nitrato)[diisopropyl (N,N-diethylcarbamyl)methylenephosphonate]dioxouranium(VI).** Bowen, S.M.; Duesler, E.N.; Paine, R.T. (Univ. of New Mexico, Albuquerque). *Inorganic Chemistry;* **22**: No. 2, 286-290(19 Jan 1983). Contract AC04-79ER10465.

The complex $UO_2(NO_3)_2[i\text{-}C_8H_7O)_2P(O)CH_2C(O)N(C_2H_5)_2]$ was prepared by the addition of $UO_2(NO_3)_2.6H_2O$ to the carbamylmethylenephosphonate ligand in ethanol. The compound has been characterized by infrared, ^1H, $^{13}C\{^1H\}$, and $^{31}P\{^1H\}$ NMR spectroscopy. A single-crystal X-ray analysis of this compound has been completed at -28°C, and the complex crystallizes in the monoclinic space group $P2_1/n$ with a = 10.520 (4) angstrom, b = 10.963 (4) angstrom, c = 20.033 (8) angstrom, β = 103.79 (3)°, Z = 4, V = 2243.7 angstrom^3, and p/sub calcd/ = 1.99g cm^{-3}. The structure was solved with use of heavy-atom techniques, and blocked least-squares refinement converged with R/sub F/ = 4.1% and R/sub wF/ = 3.9% for 4153 independent reflections with $F \geq 4\sigma(F)$. The molecular structure of the compound consists of a linear UO_2^{2+} ion surrounded at its equator by four oxygen atoms from two bidentate nitrate ions and the phosphoryl and carbonyl oxygen atoms from a bidentate phosphonate ligand. Several important bond distances include U-O(uranyl)/sub av/ = 1.7.56(6) angstrom, U-O(phosphoryl) = 2.420 (4) angstrom, U-O(carbonyl) = 2.406 (5) angstrom, U-O(nitrate)/sub av/ = 2.512 (5) angstrom, P-O(phosphoryl) = 1.485 (5) angstrom, and C-O(carbonyl) = 1.260 (8) angstrom.

32205 **Radiohalogenation of non-activated aromatic compounds via aryltrimethylsilyl intermediates.** Wilbur, D.S.; Anderson, K.W.; Stone, W.E.; O'Brien, H.A. Jr. (Los Alamos National Lab., NM (USA)). *Journal of Labelled Compounds and Radiopharmaceuticals;* **19**: No. 10, 1171-1188(Oct 1982).

The utility of aryltrimethylsilyl derivatives to regio-specifically introduce carrier and no-carrier-added quantities of radiobromine and radioiodine into certain aromatic rings has been demonstrated. Using trimethylsilyltoluenes as a model system for aromatic rings that are not highly activated, conditions for the rapid and efficient incorporation of radiobromine and radioiodine were found. Reaction conditions necessary for the radiobrominations were very mild; however, the slower radioiodinations required elevated temperatures or highly acidic conditions.

32206 **Advanced system for separation of rare-earth fission products.** Baker, J.D.; Gehrke, R.J.; Greenwood, R.C.; Meikrantz, D.H. (Idaho National Engineering Lab., Idaho Falls (USA)). *Journal of Radioanalytical Chemistry;* **74**: No. 1-2, 117-124(1982).

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A microprocessor-controlled radiochemical separation system has been further advanced to separate individual rare-earth elements from mixed fission products in times of a few minutes. The system was composed of an automated chemistry system fed by two approximately 300 μg ^{252}Cf sources coupled directly by a He-jet to transport the fission products. Chemical separations were performed using two high performance liquid chromatography columns coupled in series. The first column separated the rare-earth group by extraction chromatography using dihexyldiethylcarbamoylmethylphosphonate (DHDECMP) adsorbed on Vydac C_8 resin. The second column isolated the individual rare-earth elements by cation exchange chromatography using Aminex A-9 resin with α-hydroxyisobutyric acid (α-HIBA) as the eluent. Significant results, which have been obtained to date with this advanced system, are the identification of several new neutron-rich rare-earth isotopes including ^{166}Pm (T=48+-4 s) and ^{168}Gd (T=68+-3 s). In addition, a half-life of 41+-4 s is reported for ^{160}Eu.

4008 Combustion, Pyrolysis, And High-temperature Chemistry

REFER ALSO TO CITATION(S) 31018

32207 **(LBL—15825) Structure, inhibition, and extinction of polymer diffusion flames.** Pitz, W.J. (Lawrence Berkeley Lab., CA (USA)). May 1982. Contract AC03-76SF00098. 119p. NTIS, PC A06/MF A01. Order Number DE83011683.

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An opposed flow diffusion flame was used to study the flame structure, extinction, and inhibition characteristics of polymers. Composition and temperature profiles for combustion of high-purity polyethylene polymer in the opposed flow of a gaseous oxygen-nitrogen stream were obtained to examine the flame structure near extinction. As extinction was approached through reduction of the oxygen concentration in the oxidizer flow, the flame location moved toward the surface, the position of unity equivalence ratio moved away from the surface, and the maximum flame temperature decreased. Analysis of the flame structure showed that surface oxidation reactions are of minor importance in polyethylene combustion. Halogenated inhibitors were introduced into the flame to gain understanding of the ways inhibitors alter polymer burning characteristics and chemical reaction rates. Inhibitor effectiveness was assessed by evaluating its influence on extinction limits. The inhibitor chlorine was added to the fuel and to the oxidizer side of the diffusion flame to investigate inhibitor behavior in differing combustion environments. The order of increasing effectiveness was found to be chlorine in the oxidizer flow, chlorine in the polymer, and bromine in the oxidizer flow. A stagnation boundary-layer model with a one-step, Arrhenius-rate expression was developed to aid interpretation of the experimental investigations. The predicted flame structure from both finite-rate and flame-sheet model representations were compared to the measured structure. Penetration of oxygen through the flame was predicted by a finite-rate model, in agreement with experimental observation. The reacting boundary-layer model was used to extract global reaction rates from extinction data. The temperature dependence of the global reaction rates at extinction were largely unaffected by addition of the halogen inhibitors. 32 figures, 5 tables.

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4201 General Engineering

32208 **(LA-UR—82-3411) Comparison of two slideline methods using ADINA.** Guerra, F.M.; Browning, R.V. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 31p. (CONF-830604—1). NTIS, PC A03/MF A01. Order Number DE83003555.

From ADINA and nonlinear finite element analysis conference; Cambridge, MA, USA (15 Jun 1983).

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Two general methods of treating sliding interface problems were implemented in ADINA. The first method uses constaint equations and is based on the work of Taylor, Hughes, et al. The second method is a penalty function method where finite stiffnesses are used to simulate the contact forces. This is similar to the method used by Hallquist in NIKE2D. These may be used as no-tension sliding interfaces, with or without friction, or as a non-sliding interface to interpolate between different mesh regions. We briefly review the theory behind these methods and describe the implementation in ADINA. Several application problems have been run, including metal forming problems. Based on this experience the methods are compared in terms of ease of use, accuracy, reliability, influence on bandwidth, and solution time. Neither method is ideal. The penalty method is generally more efficient but may be inaccurate, whereas the constraint equations are accurate but less efficient. 13 references.

4202 Facilities And Equipment

REFER ALSO TO CITATION(S) 31110, 31113, 31120, 31125, 31652, 31982, 32259, 32288, 32338, 32339, 32340, 32351, 32354, 32355, 32361, 32397, 32827, 32829, 32910

32209 (AD-A—121334/7) U.S. strategic force planning: restoring the links between strategy and capabilities. Lewis, K.N. (RAND Corp., Santa Monica, CA (USA)). Jan 1982. 37p. NTIS, PC A03/MF A01.

A reasonably sound linkage between declaratory and employment doctrine and the capabilities of the strategic posture should always be an essential prerequisite to credible and secure deterrence, In most areas of military planning, analysis of the general requirements of our strategies can be an effective tool for determining what forces and plans are needed to accomplish selected missions. Because of the difficulty in devising generally acceptable strategies for nuclear employment, however, operational and force planning for nuclear forces have been particularly disconnected from each other. Consequently, the U.S. nuclear posture may be inappropriate for the tasks it may be called upon to perform. In order to restore a linkage in nuclear planning, some people have recommended that we base force design on requirements deriving from vague surrogate objectives. A more reasonable approach is the articulation and adoption of a set of force design principles and themes. These principles and themes do not themselves describe or determine strategy; instead they increase the likelihood that U.S. commanders will be able to pursue the most promising paths in an emergency. Furthermore, in peacetime, the propriety of the force can be more meaningfully measured by introducing more sophisticated and realistic mission requirements.

32210 (AD-A—123187/7) Damage function rating procedure for flat slab basement shelters. Final report. Peterson, R.E.; Bernard, R.D.; Tansley, R.S.; Willoughby, A.B.; Wilton, C. (Scientific Service, Inc., Redwood City, CA (USA)). Dec 1982. 266p. NTIS, PC A12/MF A01.

This report presents the development of procedures for rating of damage function and casualty functions for basement Civil Defense shelters. Suitable large basements, after having been upgraded during a crisis period, to withstand nuclear weapons effects including air blast, and nuclear radiation are expected to be utilized to provide protection for a large portion of the population in the event of a nuclear attack on the United States. Both risk area personnel shelters for essential workers and host area shelters for the general population are included. The report includes: a descriptive listing of basement structural systems and other pertinent basement parameters; a description of the characteristics of typical flat slab basement designs; a review of applicable casualty data and prediction models for nuclear warfare casualties; a summary of previous research on development of casualty functions; a description of the current status of the damage and casualty function development procedure; casualty function predictions for representative flat slab basements; and conclusions and recommendations.

32211 (AEEW-R—1582) Number concentrations of solid particles from the spinning top aerosol generator. Mitchell, J.P. (UKAEA Atomic Energy Establishment, Winfrith. Technology Div.). Feb 1983. 20p. UKAEA, Technology Division, AEE Winfrith, Dorchester, Dorset, England.

A spinning top aerosol generator has been used to generate monodisperse methylene blue particles in the size range from 0.6 to 6 μm. The number concentrations of these aerosols have been determined by means of an optical particle counter and compared with the equivalent measurements obtained by filter collection and microscopy.

32212 (BDX—613-2914) Calibration of hole-in-hole residual-stress measurement technique. Final report. Swanson, G.D. (Bendix Corp., Kansas City, MO (USA)). Apr 1983. Contract AC04-76DP00613. 44p. NTIS, PC A03/MF A01. Order Number DE83011408.

The hole-in-hole residual-stress measurement technique was investigated as a way to measure the residual-stress distribution through intermediate-thickness (12-mm) metal parts. Relieved surface-strain data from a set of hole-in-hole calibration experiments were evaluated. The large hole was found to cause a stress-concentration problem in the region below its bottom which the next small hole investigates. This stress concentration could be corrected by calibration, but it was easier to modify the test technique by eliminating the small holes and using finer increments of the large hole. Therefore, an incremental-drilling technique appears to be a better method for measuring the residual-stress distribution through intermediate-thickness metal parts.

32213 (BMFT-FB-HA—82-023) New handling systems as technical support for the working process. Kasiske, R.; Manske, F.; Pelull, W.; Wobbe-Ohlenburg, W. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 83p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750246.

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Following a social science based research project concerning the employment and trial of industrial robots by the Volkswagenwerk AG., information courses took place for members of the works council, shop stewards and workers. The purpose was to pass on the research results and to discuss the consequences of the introduction of new technologies for production workers. It is claimed that the use of industrial robots contributes to the improvement of working conditions. However, research results showed that the use of robots can also give rise to unfavourable consequences for working conditions. Therefore in the seminars it was discussed in detail how negative consequences, arising from the use of robots, could be prevented by the workers' representation.

32214 (CAES—673-83) Research on acoustically generated turbulence. Tiwary, R. (Pennsylvania State Univ., University Park (USA). Center for Air Environment Studies). 8 Dec 1982. Contract AC21-81MC16359. 88p. NTIS, PC A05/MF A01. Order Number DE83012121.

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The physical processes associated with the acoustic agglomeration of fine particulates are very complex with the relative motion of the particles being the result of many interacting factors. One of these factors is the random motion of the gaseous medium resulting from fluid turbulence. Any turbulence in the velocity field will result in a turbulent diffusion process which will then enhance coagulation. The hydrodynamic turbulence associated with high Reynolds number flows is of course well known and understood. Several researchers have investigated the effect of pulsating flows on the appearance of significant turbulence. Research just completed indicates that although increasing levels of turbulence are generated as acoustic levels increase into the range of 165 db, the ratio of turbulent energy to acoustic energy is about 10^{-3} for frequencies from 1000 Hz to 3500 Hz. The research was performed in a 0.3 by 0.6 by 0.025 m rectangular chamber resulting in dispersive acoustic fields. The cause of the turbulence was the acoustic streaming which resulted in a very low frequency turbulence. The interation of this low frequency turbulence with the acoustic velocities at the fundamental of the excitation frequency and harmonics resulted in a broadening of the bases of the pure tone components of the spectra in only a few locations of the space in the chamber. It is estimated that less than 20% of the chamber volume showed this phenomenon even when the maximum acoustic pressures in the chamber reached 170 db. An intermodulation distortion effect was electronically simulated and the turbulent spectra was reproduced to a remarkable degree. It is concluded, therefore, that the acoustically generated turbulent does not appear to be a significant contributor to the sonic agglomeration of submicron and micron sized aerosols.

32215 (DOE/CS/40152—T1) Investigation of motor characteristics when connected to a Nola controller. (Colorado Univ., Boulder (USA). Dept. of Electrical Engineering). 31 Dec 1982. Contract AI01-79CS40152. 217p. NTIS, PC A10/MF A01. Order Number DE83011696.

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Tests performed on Nola-type power factor controllers for induction motors are described. Emphasis on energy conservation during the past two years has prompted many manufactuers to apply to NASA for licenses to produce both single-phase and three-phase controllers of this type. Claims have been made extol-

ling the energy savings possible through the use of these devices. Units have been produced to operate with motors from fractional horsepower size up to at least one hundred horsepower. It was the purpose of this investigation to examine the behavior and efficiency of representative controllers for motors of single-phase fractional horsepower and three-phase up to 25 horsepower. In so far as possible, normal installation and operating conditions were simulated. The controllers were initially adjusted according to manufacturer's instructions and tests were run under various conditions of load and input voltage to determine their operating characteristics. Most of the controllers tested were purchased at random from representative manufacturers. However, during the period of the investigation, several manufacturers loaned controllers to the project to be tested. Some of the controllers operated reasonably well while others could not be stabilized at all. Operating data have been included for those units which were stable and mention has been made of those which were not. No tests were made at other than normal laboratory ambient temperature of approximately 20°C nor were any tests performed to check the possibility of resonance with other devices due to the harmonics induced in the voltage and/or current by the operation of the controller.

32216 **(FERMILAB/TM—1181) Report on the production magnet measurement system for the Fermilab Energy-Saver superconducting dipoles and quadrupoles.** Brown, B.C.; Cooper, W.E.; Garvey, J.D.; Gross, D.A.; Hanft, R.; Kaczar, K.P.; Pachnik, J.E.; Schmidt, C.W.; Schmidt, E.E.; Turkot, F. (Fermi National Accelerator Lab., Batavia, IL (USA)). Mar 1983. Contract AC02-76CH03000. 4p. NTIS, PC A02/MF A01. Order Number DE83012011.

The measurement system and procedures used to test more than 900 superconducting dipole magnets and more than 275 superconducting quadrupole magnets for the Fermilab Energy Saver are described. The system is designed to measure nearly all parameters relevant to the use of the magnets in the accelerator including maximum field capability and precision field measurements. The performance of the instrumentation with regard to precision, reliability, and operational needs for high volume testing will be described. Previous reports have described the measurement system used during development of the Saver magnets from which this system has evolved.

32217 **(FERMILAB/TM—1185) Maximum field capability of Energy-Saver superconducting magnets.** Turkot, F.; Cooper, W.E.; Hanft, R.; McInturff, A. (Fermi National Accelerator Lab., Batavia, IL (USA)). Mar 1983. Contract AC02-76CH03000. 3p. NTIS, PC A02/MF A01. Order Number DE83012016.

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At an energy of 1 TeV, the superconducting cable in the Energy Saver dipole magnets will be operating at ~ 96% of its nominal short sample limit; the corresponding number in the quadrupole magnets is 81%. All magnets for the Saver are individually tested for maximum current capability under two modes of operation; some 900 dipoles and 275 quadrupoles have now been measured. The dipole winding is composed of four individually wound coils. In general, the cable in the four coils comes from four different reels of cable. As part of magnet fabrication quality control, a short piece of cable from both ends of each reel has its critical current (rho = 1 x 10^{-12} Ω-cm) measured at 5T and 4.3°K. We present the statistical results of the maximum field tests on Saver magnets and explore the correlation with cable critical current.

32218 **(FERMILAB/TM—1191) Calculation of the pressure rise in the CHL 5000-gallon liquid-helium dewar.** Walker, R. (Fermi National Accelerator Lab., Batavia, IL (USA)). 4 Jan 1983. Contract AC02-76CH03000. 25p. NTIS, PC A02/MF A01. Order Number DE83012018.

The writing of a computer program to calculate the pressure rise in the CHL 5000-gallon dewar was motivated by the writing of a Fermilab engineering note on the safety of the dewar which is presently being installed at the Fermilab Central Helium Liquefier. The calculation is intended to verify that the pressure in the inner vessel will not rise above a safe level in a catastrophic venting situation.

32219 **(IFVE-OEF—81-161) Acoustic device for determination of the composition of He^3-He^4 gas mixture.** Parfenov, L.B.; Prodkoglyad, A.F. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700356.

For the purpose of adjustment of helium cryostats with dilution of He^3 in He^4 a simple device is developed by means of which one can easily define the $He^4 >= 2\%$ and continuously control the H^3 purity. The device depends on its operation on the dependence of sound velocity in gas on its molecular weight. The device consists of a pressurized cylindrical resonator where two identical acoustic cells are placed. One cell is filled with pure He^4, the other one is connected in parallel to the He^3 circulation loop. Instead of measuring self-excited oscillation frequency the wave propagation time in cells is measured. At the distance between the radiator and receiver equal to 100 mm with the mixture of $0.9He^3 + 0.1He^4$ the delay time constitutes 12.20 μs under the 30 kPa gas pressure. The device steadily operates at pressure variation in wide limits up to 5 kPa.

32220 **(JAB—10145-3) Vibration testing of an epoxy-repaired reinforced concrete test structure.** Owen, G.N.; Egbuonye, I.O.; Kustu, O.; Scholl, R.E. (URS/John A. Blume and Associates, Engineers, San Francisco, CA (USA)). Mar 1983. Contract AC08-81NV10145. 98p. NTIS, PC A05/MF A01. Order Number DE83011379.

A full-scale, 4-story reinforced concrete structure, deliverately damaged by forced vibration in 1974, was repaired by the epoxy-injection method and retested in 1979 using the same reciprocating-mass vibration generator. The program consisted of a series of tests, beginning with low-amplitude vibrations, followed by forced vibrations, increased into the range of inelastic response of the structure. The test program was similar to the 1974 testing of the original, undamaged structure. Structural damage from the first destructive test was extensive, consisting of x-cracking and spalling at the beam-column connections. The 1979 damage to the epoxy-repaired structure was similar to that sustained by the original structure in 1974, but the cracking was more widely distributed, and, in general, damage was less severe following the 1979 test. The results of this study show that, for low-amplitude motions, the epoxy-repaired structure was slightly less stiff than the original undamaged structure. However, a plot of the destructive-test data shows that, as the amplitude of the structure's response increased, the difference in stiffness between the epoxy-repaired structure and the original structure decreased. At large deflections associated with severe damage, the epoxy-repaired structure was actually stiffer than the original structure. The cracking at beam-column connections appeared to be much less severe in the 1979 test than in the 1974 test. The behavior of the test structure, in both its original and epoxy-repaired states, was compared with that of theoretical models. The stiffness of models using moments of inertia for cracked sections, as recommended in the ACI 318-77 Commentary, are representative of the stiffness of the test structure as it begins to yield and to sustain visible damage.

32221 (KFK—3290, pp 250-263) **Research on remote handling.** Boehme, G.; Koehler, W.; Selig, M. Mar 1982. (In German). NTIS (US Sales Only), PC A13/MF A01.

In Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981.

The concept of remote-handled pipe connections as a central problem of remote-controlled maintenance in the process cells of a reprocessing plant is presented, and a description of the results of the development work of the last three years is given. The experience made resulted in recommendations for the design of the pipe connections for the industrial-scale reprocessing plant in the Federal Republic of Germany.

32222 (KFK-PFT—25) New support impulse in the area of industrial robots. Martin, T. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekttraegerschaft Fertigungstechnik). Jun 1982. 78p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750031.

In this workshop problems of industrial robots were discussed by suppliers, users, and scientists. Such robots are used for handling workpieces and tools in the industry producing goods. Starting out from describing the state-of-the-art and latest experiences, development deficits are identified in detail. This includes hardware and software specifics as well as handling oriented product design and methods and tools for systems planning.

32223 (KFTI—81-22, pp 7-8) Optimum form of cryogenic pumps. Glazunov, G.P.; Kosik, N.A.; Yuferov, V.B. 1981. (In Russian). NTIS (US Sales Only), PC A07/MF A01.

In General and nuclear physics.

A problem of shape optimization of a vessel with refrigerant is considered in order to obtain the maximum flow rate while pumping at the given quantity of cryogenic liquid and minimum consumption of the refrigerant. The cone shape with H/R=0.5-2 is shown to be most optimal. Possible means of the increase of form factor for condensation pumps are presented.

32224 (KFTI—81-22, pp 9-10) Adsorption pump for helium pumping out. Donde, A.L.; Semenenko, Yu.E. 1981. (In Russian). NTIS (US Sales Only), PC A07/MF A01.

In General and nuclear physics.

Adsorption pump with adsorbent cooling by liquid helium is described. Shuttered shield protecting adsorbent against radiation is cooled with evaporating helium passing along the coil positioned on the shield. The pump is also equipped with primed cylindrical shield, cooled with liquid nitrogen. The nitrogen shield has in the lower part the shuttered shield, on the pump casing there is a valve used for pump pre-burning, and valves for connection to recipient as well. Pumping- out rates are presented at different pressures and temperatures of adsorbent. The pumping-out rate according to air at absorbent cooling with liquid nitrogen constituted $5x10^{-4}$ Pa-3000 l/s, at $2x10^{-2}$ Pa-630 l/s. During the absorbent cooling with liquid hydrogen the pumping-out rate according to air was at $4x10^{-4}$ Pa-580 l/s, at $2x10^{-2}$ Pa-680 l/s, according to hydrogen - at $8x10^{-5}$ Pa-2500 l/s, at $5x10^{-3}$ Pa-4200 l/s. During adsorbent cooling with liquid helium the rate of pumping-out according to hydrogen at $3x10^{5}$ Pa-2400% l/s, at $6x10^{3}$ Pa-1200 l/s, and according to helium at $3.5x10^{-5}$ Pa-2800 l/s, at $4x10^{-3}$ Pa-1150 l/s. The limit vacuum is equal to $1x10^{-7}$ Pa. The volume of the vessel with liquid helium is equal to 3.5 l. Helium consumption is 80 cm^3/h. Consumption of liquid nitrogen from the shield is 400 cm^3/h. The limit pressure in the pump is obtained after forevacuum pumping-out (adsorbent regeneration) at 300 K temperature. The pump is made of copper. The pump height together with primed tubes is 800 mm diameter-380 mm.

32225 (KFTI—81-22, pp 11-12) Vacuum post. Donde, A.L. 1981. (In Russian). NTIS (US Sales Only), PC A07/MF A01.

In General and nuclear physics.

A vacuum post for pumping-out of devices, used for adsorbents investigation, is described. Such vacuum post, generating pure oilless vacuum, is necessary to regenerate adsorbents under investigation. Pure oilless vacuum is produced with the help of two forevacuum pumps with the following pumping-out with highvacuum adsorption and titanium pumps. Adsorption pumps are cooled by liquid nitrogen. It is established in the result of the test of vacuum post with four devices with adsorbents connected with it, that using only adsorbtion pumps for pumping-out the pressure of $P = 10^{-1}$ Pa is achieved in devices; after preliminary blowing of all system with dry nitrogen $P=10^{-2}$ Pa; during the simultaneous operation of adsorption and titanium pumps at two-hour heating of devices with adsorbents $P=6x10^{-3}$ Pa, and at 6-hour heating $P=3.2x10^{-4}$ Pa. The limit vacuum, achieved by vacuum post, is equal to $5x10^{-5}$ Pa with devices $P=1.2x10^{-4}$ Pa. The devices heating has been carried out at 200 deg C. All post sealings are resin. Described vacuum post permits to accelerate adsorbent regeneration in devices without pollution of studied adsorbent with working substance of pumps.

32226 (KFTI—81-49, pp 56-58) Superconducting solenoid up to 11 T for the study of electronic properties of metals. Karnaukhov, I.M.; Lukhanin, A.A.; Makarov, V.I.; Samojlov, V.P.; Sporov, E.A.; Tereshina, N.S.; Fisenko, V.A. 1981. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In General and nuclear physics.

A superconducting solenoid, made of the NbTi alloy base cable with induction up to 11T is described. A superconducting cable selected on the basis of measurements of its critical characteristics and homogeneity along its length, is used to produce a solenoid. The solenoid is made as monolith with vacuum impregnation with binding. Diameter of the internal hole of solenoid is 25 mm, magnetic field homogeneity is $+-2.5x10^{-4}$ in 125 mm^3 volume. The solenoid is used for investigation of electron and magnetic properties of substances at low temperatures. Oscillation character of the dependence of magnetic moment of monocrystalline tin specimen on magnetic field value confirms the above value of solenoid magnetic field homogeneity.

32227 (ND-R—682(W)) Experience with a servo-hydraulic mechanical testing machine installed in a new shielded active facility at Windscale Nuclear Power Development Laboratories. Garlick, A.; Hindmarch, P.; Gravenor, J.G.; Rhodes, D. (UKAEA Risley Nuclear Power Development Establishment). Mar 1982. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700830.

An Instron model 1273 servo-hydraulic machine has been installed within a lead-shielded cell at Windscale in order to provide a facility capable of performing a wide range of mechanical tests on nuclear reactor structural materials and fuel assembly components. This particular type of machine was chosen because it has design features associated with the load frame, location of the actuator and adjustment and clamping of the cross-head that are especially well suited to remote operation within a shielded cell. The design of the testing facility is described and the programmes of work that have been completed over the past 11/2 years of operation are reviewed.

32228 (NP—3901013) Parameter excited oscillations in shaft hoisting systems. Jensen, J. (Technische Univ. Berlin (Germany, F.R.). Fachbereich Physikalische Ingenieurwissenschaft). 24 Jan 1980. 143p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901013.

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In this paper a study is presented of parameter excited transverse oscillations of the rope and the elevator in shaft hoisting systems. Starting from a mechanical model of such a system the differential equations of motion are given for the coupled plane transversal and longitudinal oscillations of the rope with a joint decoupled elevator and for the rotational oscillations of the elevator in the case of a variable rope length. For the resulting coupled system of non-linear differential equation, however, no solution can yet be given. Therefore a mechanical model is used, which, on the basis of reasonable practical assumptions, allows one to study the transverse oscillations of the system. The equation of motion in the transverse direction, a partial differential equation, is solved by a mixed Ritz ansatz using the approximation of semi extended Galerkin equations for three different motional states of the system. As is shown by the results, the rope can neither be treated as a rigid continuum (beam), nor as a chain, but has to be approximated by a chord.

32229 (SAND—82-1985) Computer-aided drafting and design (CAD) in the Plant Engineering organization at Sandia National Laboratories. Hall, J.T.; Knott, D.D.; Moore, M.B. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 61p. NTIS, PC A04/MF A01. Order Number DE83011375.

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The Plant Engineering organization at Sandia National Laboratories, Albuquerque (SNLA), has been working with a CAD system for approximately 2 1/2 yr, and finds itself at a crossroads. CAD has not been a panacea to workload problems to date, and Plant Engineering commissioned a study to try to determine why and to make recommendations to management on what steps might be taken in the future. Recommendations range from making the

current system more productive to enhancing it significantly with newer and more powerful graphics technology.

32230 **(SAND—83-0816C) Performance of the Sandia lightning simulator during F-14A and F/A-18 aircraft lightning tests.** Ewing, R.I. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 13p. (CONF-830618—1). NTIS, PC A02/MF A01. Order Number DE83009288.

From International conference on lightning and static electricity; Ft. Worth, TX, USA (21 Jun 1983).

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Two Navy Aircraft (F-14A and F/A-18) were subjected to high level lightning tests using the Sandia Lightning Simulator. The peak pulse currents applied were varied from 9 to 170 kiloamperes. The nominal rise time to peak was 2 microseconds. Double pulses and continuing currents were also applied. Several high current, high voltage pulses were also obtained. Ninety-six test pulses were applied to the F-14A and sixty-four pulses were applied to the F/A-18. Approximately eighty percent of these pulses met the test specifications and essentially all pulses produced useful data.

32231 **(UCRL—53046) Ductile and brittle failure design criteria for nodular cast iron spent-fuel shipping containers.** Schwartz, M.W.; Boyce, L. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 68p. NTIS, PC A04/MF A01. Order Number DE83011089.

Design criteria for preventing ductile and brittle failure are presented for spent-fuel shipping containers fabricated from ferritic nodular cast iron. A data base was assembled to determine the applicability of NRC Regulatory Guide 7.6 to ferritic nodular cast iron. In addition, fracture toughness acceptance criteria for this material were investigated using both fracture arrest and fracture initiation approaches. The study includes a review of the brittle fracture sensitivities of nodular cast iron to various processes involved in its fabrication. 19 figures, 7 tables.

32232 **Ductile alloy and process for preparing composite superconducting wire.** Finnemore, D.K.; Gibson, E.D.; Ostenson, J.E.; Verhoeven, J.D. (to Dept. of Energy). US Patent 4,378,330. 29 Mar 1983. Filed date 12 Mar 1979. vp. PAT-APPL-019808.

An alloy for the commercial production of ductile superconducting wire is prepared by melting together copper and at least 15 weight percent niobium under non-oxygen-contaminating conditions, and rapidly cooling the melt to form a ductile composite consisting of discrete, randomly distributed and orientated dendritic-shaped particles of niobium in a copper matrix. As the wire is worked, the dendritic particles are realigned parallel to the longitudinal axis and when drawn form a plurality of very fine ductile superconductors in a ductile copper matrix. The drawn wire may be tin coated and wound into magnets or the like before diffusing the tin into the wire to react with the niobium. Impurities such as aluminum or gallium may be added to improve upper critical field characteristics.

32233 **Clamp for use in winding large magnet coils.** Brown, R.L.; Kenney, W.J. (to Dept. of Energy). US Patent 4,376,384. 15 Mar 1983. Filed date 5 May 1981. vp. PAT-APPL-260624.

In one aspect, the invention is a novel arrangement for applying forces to turns of a vertically extending helical coil which is wound about a support. The apparatus includes a first rigid member extending towards the turns. A second rigid member extends transversely from the end of the first and has a vertically extending face provided with a generally straight groove extending transversely of the turns. A longitudinal passage in the first member connects to the groove to form therewith a continuous guideway for rollable articles. A rigid lug longitudinally movable in the groove is provided with a projection which extends out of the groove and beneath the bottom of a selected turn of the coil. A train of rigid, rollable articles is disposed in the guideway inwardly of the lug. Means are provided for applying force to that end of the train which is relatively remote from the lug, to urge the latter against the bottom face of the selected turn. As a result, that turn is moved upward along the face of the support, establishing a selected spacing between that turn and the previously formed turn of the coil. When upward movement of the selected turn stops, the force applied to the lug immediately translates to a force which urges the above-mentioned grooved face against all of the formed turns, thus compressing them against the support. The above-mentioned first and second members are swingably mounted so that they can be temporarily moved out of the winding path, thus permitting continuous winding.

4203 Lasers

REFER ALSO TO CITATION(S) 32146, 32266, 32379

32234 **(AD-A—121183/8) Measurement of fluorine atom concentrations and reaction rates in chemical laser systems. Final report 23 Jul 80-30 Jun 82.** Stanton, A.C.; Wormhoudt, J.C.; Duff, J.W. (Aerodyne Research, Inc., Bedford, MA (USA). Center for Chemical and Environmental Physics). Sep 1982. 34p. NTIS, PC A03/MF A01.

The line positions of all three components of the fluorine atom ground state fine structure transition have been measured by diode laser absorption spectroscopy, using a water vapor pure rotational line at 404.077/cm as a wavelength reference. These results imply a spin orbit splitting for fluorine of 404.142 + or - 0.005/cm. The results for the line positions are in excellent agreement with independent, concurrent measurements performed at the Los Alamos National Laboratory, using vibration-rotation lines of CS2 as the wavelength references. The line separations observed in both sets of experiments agree with the F atom zero-field hyperfine splittings obtained from electron paramagnetic resonance studies. Collisional broadening of the strongest fluorine atom transition (the 1 approximate 2 hyperfine component) was measured in this study for helium (T = 300 K to 800 K), argon (T = 300 K) and nitrogen (T = 300 K) perturbers. The experimental results for fluorine atom line widths are compared with predictions from the classical Lindholm-Foley theory, using available ab initio and experimentally-derived fluorine atom-rare gas interaction potentials, as well as semiempirical Lennard-Jones potentials. Good agreement is obtained for broadening by argon and for the temperature dependence of broadening by helium.

32235 **(AD-A—121256/2) Optical resonance transfer laser (ORTL) development. Final technical report 27 May 80-27 May 82.** Baily, P.K.; Wang, J.H.S.; Finzi, J.; Smith, R.C.; Paranto, J. (Hughes Aircraft Co., El Segundo, CA (USA)). Jul 1982. 129p. NTIS, PC A07/MF A01.

This report describes an experimental program aimed at assessing the feasibility of using an intracavity ORTL system for HF laser mode control. The initial experiments utilized existing extracavity ORTL hardware to continue the investigation of ORTL kinetics. The most significant result of these initial experiments was the identification of SF_6 as an alternative diluent to helium. The major part of the program was devoted to the fabrication and use of new intracavity ORTL hardware. Temporally stable spectrally controlled intracavity ORTL operation was demonstrated for the first time. The combined use of spectral control coatings in the chemical laser resonator and inlet temperature control of the ORTL medium resulted in ORTL outputs up to 152 watts and overall efficiencies of HF chemical laser radiation to HF ORTL output up to 38%. Detailed measurements of energy deposition in mirrors and in the ORTL medium, of temperature profiles, and of small signal gain utilizing helium and SF_6 as ORTL diluents were made over a wide range of operational ORTL parameters. The simultaneous development of an intracavity ORTL model, including an HF chemical laser simulation, allowed comparison of theory and experiment. This resulted in the achievement of a good understanding of the physical processes which are important for efficient intracavity ORTL operation. The model code can now be used for the design of larger systems. Efficiencies of 85 to 90% should be attainable in large systems.

32236 **(AD-A—121267/9) Numerical study of phase conjugation in stimulated backscatter with pump depletion. Memorandum report.** Lehmberg, R.H. (Naval Research Lab., Washington, DC (USA)). 17 Sep 1982. 13p. NTIS, PC A02/MF A01.

Two dimensional numerical simulations are presented of phase conjugation in stimulated backscatter of a focused abberrated beam, including the effects of pump depletion. In all cases, pump depletion significantly improved the conjugation fidelity H. As expected, the far field distribution of light scattered back through the aberrator exhibited a prominent axial spike closely matching that of the incident beam; however, the near field distribution had large and rapid spatial inhomogeneities, even for H approximately 90%. In spite of such structure, the backscatter was able to reproduce a rough image of large scale modulation in the incident beam.

32237 **(AD-A—121269/5) Intensity noise and spectral properties of low noise GaAlAs lasers. Interim report.** Dandridge, A.; Goldberg, L.; Miles, R.O. (Naval Research Lab., Washington, DC (USA)). 29 Sep 1982. 16p. NTIS, PC A02/MF A01.

We present measurements of the output properties of two types of new low noise noncommercially available Hitachi diode lasers. Measurements of the intensity and phase noise of lasers running with or without optical feedback are described.

32238 **(AD-A—123480/6) Experimental determination of two-photon and other nonlinear absorption in ultraviolet and infrared window materials. Semiannual technical report 1 Oct 76-31 Mar 77.** Bloembergen, N.; Blake, J. (Harvard Univ., Cambridge, MA (USA). Div. of Engineering and Applied Physics). 31 Mar 1977. 40p. NTIS, PC A03/MF A01.

Experimental determination of two photon absorption cross section in a variety of window materials is carried out with picosecond harmonic pulses from a mode-locked Nd-YAG laser system, with nanosecond pulses from a combined ruby-dye laser system, and with a subnanosecond CO_2-laser pulses. The measurements at 10 micrometers concentrate on the properties of the conduction and valence band of InSb. The measurements of the two photon absorption cross section in the near and far ultraviolet have covered a series of alkali halides, and will be extended to other fluoride and oxide UV window materials.

32239 **(BDX—613-2906) Laser cutting plastics. Final report.** Van Cleave, R.A. (Bendix Corp., Kansas City, MO (USA)). Apr 1983. Contract AC04-76DP00613. 20p. NTIS, PC A02/MF A01. Order Number DE83011130.

Laser cutting and drilling various types of plastic and ceramic materials have been investigated. Nearly 100 different parts currently use laser technology as part of their production processes. A brief discussion of the 1000-W CO_2-laser-development activities and typical production of parts is presented. The 1000-W CO_2 laser proved to be a reliable, practical, and cost-effective machine tool.

32240 **(LA-UR—83-1171) Two-photon optically pumped molecular gas visible laser.** Quick, C.R. Jr.; Glownia, J.H.; Tiee, J.J.; Archuleta, F.L. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 11p. (CONF-830425—12). NTIS, PC A02/MF A01. Order Number DE83011144.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

Recent investigations of the multiphoton ionization (MPI) spectrum of gaseous ammonia have led to the discovery of a novel two-photon pumped molecular gas electronic transition laser. Resonant, two-photon electronic excitation of NH_3 in the near uv (~ 305 nm) leads to the first observation of fluorescence from NH_3 excited states (B and C'), and, at higher pressures, to lasing action (~ 570 nm) between numerous C' and A state vibronic levels. A frequency-doubled Nd:YAG pumped dye laser (a few mJ) is focused into a cell containing NH_3 (or ND_3). Stimulated emission is observed in the forward and backward direction at NH_3 pressures greater than ~ 200 torr, without external mirrors to provide feedback. Conversion coefficiencies (output NH_3 pulse energy/input pulse energy) as high as 2% have been observed.

32241 **(LA-UR—83-1224) Evolution of long pulses in a tapered wiggler-free electron laser.** Goldstein, J.C. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 17p. (CONF-830425—13). NTIS, PC A02/MF A01. Order Number DE83011179.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

The evolution of a long pulse (pulse length much greater than the slippage distance) in a tapered wiggler free electron laser oscillator is studied by numerical solution of the one dimensional theoretical model for a realistic set of magnet, electron beam, and optical resonator parameter values. Single pass gain curves are calculated for low and high light intensities. It is found that an initial, low amplitude, incoherent pulse grows into a coherent pulse whose growth rate agrees with the calculated small signal gain curve. The transient evolution of coherent pulses is calculated for several different cavity length detunings, and a quasi-steady-state desynchronism curve is obtained. Various pulse features for two points along the desynchronism curve are given. The frequency changing behavior (chirping) of the optical pulse during transient evolution is examined.

32242 **Damage thresholds at metal surfaces for short pulse IR lasers.** Figueira, J.F.; Thomas, S.J. (Los Alamos Nat'l. Lab., Univ. of Calif., Los Alamos, NM 87545). *IEEE (Institute of Electrical and Electronics Engineers) Journal of Quantum Electronics;* **QE-18**: No. 9, 1381-1386(Sep 1982).

Measurements of damage to metal surfaces induced by intense nanosecond pulses of IR radiation are reported. Single-shot damage thresholds of Cu, stainless steel, molybdenum, and aluminum surfaces have been measured for various angles of incidence and the predicted increase in damage thresholds for grazing incidence optical components have been experimentally verified for the first time at 10 μm. In addition, multiple-shot damage tests have been performed and practical lifetime curves for Cu mirrors have been established. The results are compared with existing theoretical models and shown to be in general agreement.

32243 **Gain saturation in Nd: doped laser materials.** Martin, W.E.; Milam, D. (Lawrence Livermore Nat'l. Lab., Univ. of Calif., Livermore, CA 94550). *IEEE (Institute of Electrical and Electronics Engineers) Journal of Quantum Electronics;* **QE-18**: No. 7, 1155-1163(Jul 1982). Contract W-7405-ENG-48.

Saturation of gain in Nd:doped silicate, phosphate, and fluorophosphate glasses, and in doped crystals of YAG and YLF was observed during amplification of 1064 and 1053 nm pulses with durations of 1.0,9.0,and 50 ns. Saturation fluences were computed from measured external parameters by means of the Frantz-Nodvik model for a homogeneous amplifier. The resulting values of saturation fluence increase with increasing output fluence and were only slightly greater at 50 ns than at 1 ns, suggesting that the lower level lifetime is less than 1 ns.

32244 **Infrared laser system.** Cantrell, C.D.; Carbone, R.J.; Cooper, R. (to Dept. of Energy). US Patent RE 30,898. 6 Apr 1982. Filed date 16 Mar 1979. vp.

PAT-APPL-967171.

An infrared laser system and method for isotope separation may comprise a molecular gas laser oscillator to produce a laser beam at a first wavelength, raman spin flip means for shifting the laser to a second wavelength, a molecular gas laser amplifier to amplify said second wavelength laser beam to high power, and optical means for directing the second wavelength, high power laser beam against a desired isotope for selective excitation thereof in a mixture with other isotopes. The optical means may include a medium which shifts the second wavelength high power laser beam to a third wavelength, high power laser beam at a wavelength coincidental with a corresponding vibrational state of said isotope and which is different from vibrational states of other isotopes in the gas mixture.

4204 Heat Transfer And Fluid Flow

REFER ALSO TO CITATION(S) 31077, 31126, 31130, 31131, 31132, 31284,

31286, 31597, 31598, 31632, 31686, 31783, 32000, 32782

32245 (EIR—474) Rough surface heat transfer and pressure drop. Hudina, M. (Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland)). Aug 1982. 224p. NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750422.

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Heat transfer on rough surfaces has already been well investigated. For the use of these surfaces in thermal engineering, the frictional characteristics are also important. The theoretical study of the behaviour of surfaces can contribute to the understanding of these phenomena. However, well-oriented experiments are the best way to investigate their performances. These are reported under different categories, but a good review of the most recent state-of-the-art can still be given and the influences of the different parameters discussed in detail. For the determination of the thermal-hydraulic performances of rough surfaces, the method of evaluation is particularly important. In order to increase confidence in the results, a new evaluation procedure was introduced. This procedure is based on the transformation of simple channel experimental results to equal boundary conditions, and on the suitable application and confirmation of these transformed values in more complicated flow channel geometries. Existing methods, applied to the results obtained in an annular channel, do not fulfil all the transformation requirements. Thus a new, more-complete transformation method, which uses the turbulent eddy diffusivity model, was developed. To check the quality of this transformation, within the scope of the new evaluation procedure, the results of experimental investigation in annular channels and in a bundle of hexagonal geometry were used together with the predictions of benchmark calculations. The success of the new method was confirmed by extensive comparisons, with the results of different presently-acknowledged transformations being considered as well. Based on these comparisons an assessment of the individual transformations is given. Although other methods also give useful results, the advantage of the new transformation can be clearly recognised under particular conditions.

32246 (LBL—12009-Rev.2) Generalized algebraic relation for predicting developing curved-channel flow with a k-ϵ model of turbulence. Humphrey, J.A.C.; Pourahmadi, F. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 18p. (CONF-810927—1-Rev.2). NTIS, PC A02/MF A01. Order Number DE83009946.

From 3. symposium on turbulent shear flow; Davis, CA, USA (9 Sep 1981).

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Using algebraic approximations for the Reynolds stress equations a general expression has been derived for C/sub μ/ in nu/sub t/ = C/sub μ/ k^2/ϵ which accounts simultaneously for the effects of streamline curvature and pressure-strain in the flow, including wall-induced influences on the velocity fluctuations. The expression derived can be shown to encompass similar but more specific formulations proposed by Bradshaw, Rodi, and Leschziner and Rodi. The present formulation has been used in conjunction with a k-ϵ model of turbulence of predict developing, two-dimensional, curved channel flows were both curvature and pressure-strain effects can be large. Minor modifications to include the influence of curvature on the length scale of the flow near the walls produce a significant improvement in the calculations. While, in general, predictions are in good agreement with experimental measurements of mildly and strongly curved flows, the model tends of overpredict the kinetic energy of turbulence in the inner-radius (convex) wall region. This is attributed to a breakdown of the assumption that u/sub i/u/sub j//k is a constant in the derivation of the general expression for C/sub μ/. Most of the experimental results suggest the presence of a weak cross-stream motion due to Taylor-Goertler vortices which cannot be resolved by the calculation scheme. Despite its limitations the present formulation provides a degree of generality not previously available in two-equation modeling of turbulent flows.

32247 (NP—3901155) Experimental studies of the frequency and the properties of vortex structures at the boundary of the turbulent flow field behind a cylinder. Delitzsch, V. (Max-Planck-Institut fuer Stroemungsforschung, Goettingen (Germany, F.R.)). May 1982. 53p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901155.

In the first part of this paper results are presented of simultaneous measurements of the temperature and velocity distribution in vortex-like flow structures, as they can be observed at the boundary of a turbulent flow-field behind a cylinder for a Reynolds number of 50,000. The temperature distribution in such vortices, which depends on the dissipation and diffusion of vortex strength, can be described qualitatively by a simple model. In addition the observed complex temperature and velocity characteristics can be described as a superposition of simple basic structures. The frequency distribution of the time intervals between two succeeding vortices at the boundary of the flow field behind a cylinder can be treated as a superposition of two distributions: an exponentially decreasing Poisson distribution corresponding to statistically independent events, and a probability distribution, which describes the appearance of vortex structures in time intervals according to the Strouhal frequency. Finally temperature measurements have been performed, using a system with 7 fast temperature probes, to determine the orientation of the vortex axis. The mean orientation of the vortices is found, as presumed, to be parallel to the cylinder axis, however, some prefered non-parallel orientations can be observed.

32248 (OEFZS—4164) Corrected solutions of eigenvalue problems at transient heat with turbulent pipe flow. Schmidl, H. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna). May 1982. 64p. (In German). (RS—203/82). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83700355.

For a given turbulent pipe flow, the transient heat occurs by convection as well as by thermal diffusitivity. The problems of their Eigenvalues will be analized in order to find out a corrected solution.

32249 Reaction and transport in disordered composite media: introduction of percolation concepts. Mohanty, K.K. (Univ. of Minnesota, MN); Ottino, J.M.; Davis, H.T. *Chemical Engineering Science;* **37**: No. 6, 905-924(1982).

Reaction and transport in disordered composites are percolation processes. The relevant ideas of percolation theory are examined and illustrated with the aid of computer simulations. The concepts of percolation theory closely coupled with computer constructs and mathematical modelling provide potent tools for understanding the role of irregular morphology in transient reaction and diffusion processes in disordered composites. Examples given involve diffusion, combustion, and catalysis in porous media, conduction in cellular media, and reaction and conduction in branched polymer systems. The rate at which a combustible porous medium becomes unconsolidated (disintegrates) under combustion is predicted. The effect of porosity on gas penetration and reaction rate in a porous pellet supporting a catalyst is investigated. Transient conduction in cellular systems is studied. Conduction in regular cellular media (squares and hexagons) is compared to conduction in irregular cellular media (Voronoi polygons). The effect of randomly distributed impervious cells and cell-walls is examined. The role of bond coordination number in the molecular weight distribution, gel formation, and electrical conduction of branched polymers is studied.

4205 Materials Testing

REFER ALSO TO CITATION(S) 32227

32250 (ANL—82-62, pp 477-487) **Acoustic system for monitoring pressure boundary wear.** Youngdahl, C.A.; Ellingson, W.A. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

An ultrasonic pulse-echo instrumentation system employing specially designed acoustic waveguides has been developed to monitor pressure equipment boundary thickness at high temperatures. The automatic equipment and techniques have been applied for on-line assessment of erosive wear of coal conversion process equipment operating at up to ~ 540°C in liquefaction and gasification pilot plants. This report describes the waveguides and transducers, electronic instruments, and computer that make up the system. The automatic monitoring system and the techniques described can be used for continuous monitoring of pressure-boundary thicknesses at high temperatures. Measurement precision of +- 0.05 mm can be achieved under steady temperatures, or when the local temperature distribution is well known or compensated, by use of acoustic waveguides of up to 0.6 m in length. Instrumentation and techniques suitable for use in operating plants have been developed through laboratory and field tests. Real-time erosive wear results are of substantial value in the assessment of material/design choices in pilot plants. The remote scanning system can also be utilized in full-size plants with confidence and convenience to help avoid unexpected failures of components.

32251 (INIS-mf—7500, pp vp) **Surface activation by charged particles applied to the on-line measurement.** Tendera, P.; Frynta, Z. (Statni Vyzkumny Ustav Materialu, Prague (Czechoslovakia)). [nd]. NTIS (US Sales Only), PC A04/MF A01. (CONF-8009295—Absts.).

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

32252 (INIS-mf—7500, pp vp) **Use of gamma spectrometry for the study of surface contamination of pure semiconductors during chemical treatment.** Biheler, J.; Pibil, J. (Vyzkumny Ustav Vodohospodarsky, Prague (Czechoslovakia)); Tykva, R.; Hanzlik, J. (Ceskoslovenska Akademie Ved, Prague. Ustav Organicke Chemie a Biochemie); Skrivankova, M. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)). [nd]. NTIS (US Sales Only), PC A04/MF A01. (CONF-8009295—Absts.).

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

32253 **International Advances in Nondestructive Testing. Volume 9.** McGonnagle, W.J. (ed.). New York, NY; Gordon and Breach, Science Publishers, Inc. (1983). 369p. Gordon and Breach, Science Publishers, Inc., One Park Ave., New York, NY 10016.

Thirteen papers on recent advances in nondestructive methods are included in this volume. A separate abstract was prepared for each of 2 papers. The remaining 11 papers are not in scope for the data base. (LCL)

32254 **Propagation of light in optical fibers.** Feit, M.D. (Lawrence Livermore National Lab., CA). *International Advances in Nondestructive Testing:* 9: 1-16(1983). Contract W-7405-ENG-48.

The technology of using glass fibers to carry signals impressed on light beams has grown exponentially over the past decade owing to the many advantages of this transmission medium. These include small size, low weight, high bandwidth and immunity to electromagnetic interference. Applications already realized range from telephone and television subscriber loops to data acquisition for nuclear weapons tests. We have developed a very complete theoretical model of light propagation in optical fibers, which treats the total transmitted beam rather than individual modes of the system. The model allows us to study important aspects of light propagation in realistic fibers: spatial and angular confinement of the transmitted light, power losses due to absorbing jackets and splices, and bandwidth restrictions that result because the individual modes propagate energy with differing group velocities. In addition, we can retrieve a complete modal descripion of the light, i.e., find all the mode shapes and their corresponding wavenumbers. This model allows us to treat fibers with arbitrary refractive index profiles, with finite core and cladding regions, and with lossy components. It also serves as a check on more approximate theoretical methods. Excellent agreement with experimental results gives us confidence in the applicability of the model to real situations.

32255 **Review of holographic nondestruction evaluation at Lawrence Livermore National Laboratory.** Boyd, D.M. (Lawrence Livermore National Lab., CA). *International Advances in Nondestructive Testing:* 9: 159-176(1983). Contract W-7405-ENG-48.

At Lawrence Livermore National Laboratory two holographic facilities have been established for the technology transfer of holographic interferometry. This report is a review of the principles of holographic interferometry (HI) and the application of this technique to nondestructive evaluation. Simplified quantitative analysis using a coincident viewing and illumination optical arrangement are described.

4206 Safety Engineering

32256 (PTB-W—17) **Critical investigation of pressure measuring methods in the testing of explosion-proof electrical machinery.** Loeper, R.; Wehinger, H. (Physikalisch-Technische Bundesanstalt, Braunschweig (Germany, F.R.). Abt. Waerme). Sep 1981. 23p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750029.

Electrical machinery used in areas with an explosive atmosphere must be ignition-proof. Ignition protection may be achieved in different ways. For example, machines working at higher temperatures or sending off sparks may be enclosed by a flameproof enclosure. In case of an explosion inside, this housing must prevent flames from entering the surrounding explosive atmosphere. This requires rigid dimensional tolerances for unavoidable gaps, e.g. of shafts and closures, and a design that will withstand flames and internal explosion pressure. The applicability of various methods of measurement is discussed, and possible causes of errors are pointed out. Recommendations are derived for the application and handling of pressure measuring systems in the testing of explosion-proof electrical machinery.

32257 **Numerical methods for probalistic dimensioning and safety calculation.** Fiessler, B.; Hawranek, R.; Rackwitz, R. Muenchen, Germany, F.R.; Technische Univ. (1976). vp. (In German and English).

The computation of failure probability is substituted by the search for the minimum of a function, i.e. the smallest distance of the boundary state function to the origin of the coordinate system, in that case that the variables can be normalized and standardized in a convenient way. The corresponding solution algorithms are based on a piece-wise iterative linearization of the boundary state function. It appears that there can be determined at least boundaries for the true failure probability. This contribution compiles the mathematical foundations and numerical problems of some of the techniques contained in the solution of the algorithm. Programmes are given in the appendix, that are written in ALGOL and have been tested (BETAABIT, BROYDEN, THETAIT). Any dimensioning problems, whose variables possess any distribution functions, can be solved.

32258 **Numerical methods for probalistic dimensioning and safety calculation.** Muenchen, Germany, F.R.; Technische Univ. (1976). vp.

The discrete safety checking methods are generalized with respect to arbitrary distributional assumptions and correlations. In essence, non-normal distributions are approximated by normal distributions in the design point in a first order sense.

4207 Vacuum Engineering

REFER ALSO TO CITATION(S) 32050

32259 (KFTI—81-22, pp 3-6) **Small-sized cryoadsorption pump for the systems of mass-spectrometric search for leaks.** Kupriyanov, V.I.; Lunchev, V.P.; Alejnik, Yu.V.; Isaev, A.V. (Nauchno-Proizvodstvennoe Ob"edinenie Kriogennogo Mashinostroeniya, Balashikha (USSR)). 1981. (In Russian). NTIS (US Sales Only), PC A07/MF A01.

In General and nuclear physics.

Two schemes of gas supply at the leak testing by the feeler method are investigated: gas supply in the volume of cryoadsorption pump and directly into the adsorption layer. It is shown that during the gas supply into the adsorbent layer the sensitivity of search for leakage increases two times and is $3x10^{-11}$ m³ Pa/s. Pressure dependence in the output cross section of the pump on the time of its service is studied and it is established that at the unitial moment at the gas supply into adsorbent layer, vacuum is an order deeper, however in 20 hours of operation this effect is levelled. Value of optimum flow through the feeler is determined (4-5.5)$x10^{-8}$ m³ Pa/s. The use of supposed technique during the control of article tightness positioned in the chamber of the 100 m³ volume, permits to decrease the minimally recorded helium flow up to $5x10^{-11}$ m³ Pa/s and to reduce the duration of tests in 25%.

4208 Electronic Circuits And Devices

REFER ALSO TO CITATION(S) 32048

32280 **(KFK—3364) Theoretical and practical contribution to the trirotron, a new power UHF amplifier with high efficiency.** Mueller, K.R. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik). Jul 1982. 124p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750032.

Thesis. Submitted to Karlsruhe Univ.

The Trirotron is a future UHF high power amplifier working with the modulation of the azimuthal entrance angle of the electron beam in the output travelling wave resonant ring. It promises MW cw and high efficiency. Different kinds of the Trirotron and their working principle are discussed. A theoretical treatment of the Trirotron is undertaken. Measurements on a test model of the steering resonant ring are carried out showing the only in one direction azimuthal rotating RF wave. The design and construction of an experimental device for generating and measuring the rotating electron beam is presented.

32281 **(LA-UR—83-1096) Measurement of megampere currents with optical fibers.** Veeser, L.; Kania, D.; Freeman, B.; Kruse, P.; Zimmerman, E. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 7p. (CONF-830425—9). NTIS, PC A02/MF A01. Order Number DE83011168.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

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Fiber optic sensors are routinely used to measure multi-megampere currents. The sensors are low noise, absolutely calibrated, and electrically decoupled from the pulsed power source. Polarized light from a HeNe laser is guided past the current carrier by a single-mode, low-birefringence fiber. The magnetic field from the current causes a Faraday rotation of the light polarization which is detected by a polarization analyzer and photodiode at the end of the fiber. A rotation of about 250°/MA +- 5%, slightly less than the Verdet constant for non-birefringent silica glass was observed. It was found that highly birefringent (polarization preserving) optical fibers do not work in this application. The sensor is being ruggedized for field use with high-explosive-driven current sources by using a diode laser and single mode fiber couplers to replace the laboratory system of lenses and spatial filters.

32282 **(MLM—3062(OP)) Vacuum-injection molding of glass-metal electrical components.** Kramer, D.P.; Massey, R.T. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 1983. Contract AC04-76DP00053. 21p. (CONF-830451—1). NTIS, PC A02/MF A01. Order Number DE83011024.

From American Ceramic Society annual meeting; Chicago, IL, USA (25 Apr 1983).

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Vacuum-injection molding is an innovative processing technique, useful in the fabrication of complex glass or glass-ceramic to metal seals. During vacuum-injection molding, molten glass is injected under pressure into the metal parts held in a mold while a vacuum is simultaneously pulled on the opposite side of the mold. The process, which is completed at low processing temperatures, improves glass flow, facilitates the removal of trapped gasses, and makes possible the fabrication of seals of complex geometry. These advantages with examples are presented. 10 figures.

32283 **(UCRL—88923) Failure and switching mechanisms in semiconductor p-n junction devices.** Yee, J.H.; Orvis, W.J.; Khanaka, G.H.; Lair, D.L. (Lawrence Livermore National Lab., CA (USA)). 23 Mar 1983. Contract W-7405-ENG-48. 7p. (CONF-830621—1). NTIS, PC A02/MF A01. Order Number DE83009811.

From IEEE power electronics specialists conference; Albuquerque, NM, USA (6 Jun 1983).

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We use theoretical results obtained with computer models to interpret existing experimental data related to second breakdown mechanisms. We show that if you solve the complete set of transport equations for electrons, holes, and heat, you can model three kinds of second breakdown phenomena: current mode (CSB), thermal mode (TSB), and current-thermal (CSB-TSB) mode second breakdown. We also discuss the effect of the input voltage pulse shape on the current switching time of a p-n junction device.

4209 Waste Processing Plants And Equipment

REFER ALSO TO CITATION(S) 32271

32284 **(BMFT-FB-T—82-196) Test plant for pyrolysis of solid waste and sludge with fluid slag removal (Andco - Torrax - System).** Dirks, E.; Hillebrand, P. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 100p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750255.

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The environmental impact and the economy in connection with the above method should be evaluated on the basis of experiments. The three-year test running of the plant (with interruptions), in which period the most important features have been measured, has led to the following conclusions: a steady running of the plant is only possible for a limited period of time. There are no environmental advantages in respect of gas emission, dust emission and slag quality in comparison to an incineration plant. The plant requires considerably more primary energy than originally guaranteed, so that no economic advantages can be expected. The high temperature pyrolysis in the form that has been tested is no alternative to waste incineration.

32285 **(PB—83-154344) Significance of size reduction in solid waste management. Volume 3. Effects of machine parameters on shredder performance. Final report Sep 79-Aug 82.** Savage, G.M.; Tuck, J.K.; Gandy, P.A.; Trezek, G.J. (Cal Recovery Systems, Inc., Richmond, CA (USA)). Jan 1983. 87p. NTIS, PC A05/MF A01.

Hammermill shredders for size reduction of refuse were examined at three sites to determine the influence of key machine parameters on their performance. Internal machine configuration and single-versus two stage size reduction were studied. Key parameters that were investigated and could be related to performance include the number and volume of hammers, open volume fraction, hammer tip speed, grate opening, open volume, and closed volume. The machine parameters were related to throughput, mill holdup, specific energy requirements, power draw, and product size using test data and curve fitting analysis.

4210 Combustion Systems

REFER ALSO TO CITATION(S) 31147, 31149, 31150, 31151, 31152, 31153, 31602, 31921, 31967

32286 **(AD-A—121179/6) Laser velocimeter measurements and analysis in turbulent flows with combustion. Part I. Interim report 1 Jan-31 Dec 81.** Stevenson, W.H.; Thompson, H.D.; Luchik, T.S. (Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering). Sep 1982. 93p. NTIS, PC A05/MF A01.

Laser velocimeter measurements of mean velocities and turbulence parameters were made in a cylindrical simulated dump combustor. Velocity bias errors were eliminated by use of an experimental technique developed in an earlier study. A comparison of mass flux at different downstream locations based on the measured velocity profiles showed good agreement with the inlet mass flux. The measured mean velocity profiles were in good qualitative agreement with predictions based on the 2/E/FIX computer code, although some discrepancies in qualitative values due to code limitations were noted.

32267 **(DOE/CS/40107—T10) Energy conservation in industrial operations - method and economics of improved combustion efficiencies. Topical report. Combustion-control systems for process heaters and boilers.** Varma, A.C.; Prengle, H.W. Jr. (Houston Univ., TX (USA). Dept. of Chemical Engineering). Jan 1979. Contract AS05-76CS40107. 105p. NTIS, PC A08/MF A01. Order Number DE83010998.

The importance and applications of modern combustion control systems for retrofitting existing boilers and heaters to increase combustion efficiency are discussed. The conventionally used heater control system and its deficiencies are discussed in detail and the need for modern control systems is stressed. Modern combustion control systems are designed to provide safe and efficient combustion and desired air/fuel ratio, reducing excess air to an optimum minimum (in the range of 3 to 5%). They can provide the required plant energy demand with varying factors, such as: Btu input of the fuel, specific gravity, fuel flow rate changes, fuel pressure, combustion air temperature changes, and can also provide control for dual firing. Combustion control systems supplied by four manufacturers were studied. All four are engaged in developing and manufacturing advanced process control instruments and systems to meet the needs of industry. Conclusions from the study are: modern combustion control systems are available commercially to reduce excess air to a level of 3 to 5%, using high efficiency burners; the cost of such systems are approximately $50 to 60,000, exclusive of any burner replacement, if needed; resulting fuel savings by retrofitting will be in the range of 5 to 15% depending on the condition of the furnace; and the payout period, in most cases, will be less than one year.

32268 **(DOE/ET/13152—T2) Measuring and modeling solids movement in a large, cold fluidized-bed test facility. Final report.** Daous, M.; Mrazek, R.V.; Crane, S.; Fitzgerald, T.J. (Oregon State Univ., Corvallis (USA). Dept. of Chemical Engineering). Apr 1983. Contract AC01-79ET13152. 204p. NTIS, PC A10/MF A01. Order Number DE83010952.

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Solids movement in a large-particle fluidized bed was studied in an 18 in x 18 in (46 cm x 46 cm) tube-filled, cold fluidized-bed test facility. Direct measurement of local solid mass flux in two dimensions at various locations inside the bed was made possible by a new instrument developed in this study. This instrument can be installed as a part of the bed internal tube array and hence does not interfere with the solid flow field being measured. The instrument makes use of the magnetic property of solid and requires a bed media consisting entirely of magnetic solid particles. Iron particles with a mean particle diameter of 0.032 in (0.8 mm) and a density of 387 lb/ft^3 (6200 kg/m^3) were used. Experiments were conducted at room temperature and atmospheric pressure with air as the fluidizing gas. Two gas velocities above the minimum fluidizing velocity were used. The net local solid movement and the gross solid circulation pattern inside the bed were deduced from the vertical and one horizontal component of the local solid mass fluxes measured at various locations inside the bed. Two specific solid flow regions were found to exist. The net solids movement in the middle bubbling region of the bed was in the upward direction while adjacent to the bed walls the net solid movement was downward. The net lateral solid movement was not significant in the bubbling region of the bed. However, at the bottom of the bed this movement can be significantly enhanced by means of an uneven gas velocity distribution inside the bed. A theoretical model for the gross solid circulation observed in a freely bubbling fluidized bed is proposed.

4220 Underground Engineering

REFER ALSO TO CITATION(S) 31120

32269 **(NP—3901172) Experimental and theoretical determination of pressure changes after entry of a high-speed train into a tunnel.** Sellmann, M. (Technische Hochschule Darmstadt (Germany, F.R.). Fachbereich Maschinenbau). 30 Mar 1979. 129p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901172.

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Experimental parameters cover the interesting range of, at present, train Mach numbers up to 0.4 and ratios α (cross sectional area of trains to cross sectional area of tunnel) up to about 0.4. In the experiments, train models with differently shaped front parts were driven at constant speed through tunnel models with three different area ratios, and the wall pressure was recorded as a function of time in various equidistant measuring points (with the rear of the train model always remaining outside the tunnel).

4240 Pollution Control Equipment

REFER ALSO TO CITATION(S) 31092, 31095, 31096, 32160

32270 **(AD-A—123176/0) Catalytic reduction of nitrogen dioxide. Technical report.** Breisacher, P.; Mahadevan, P.; Coffer, J.G. (Aerospace Corp., El Segundo, CA (USA). Aerophysics Lab.). 30 Sep 1982. 28p. NTIS, PC A03/MF A01.

The feasibility of using a noble metal catalytic reactor to treat the effluents from a scrubber or incinerator treating N_2O_4/NO_2 at space shuttle launch sites and other STS facilities has been explored experimentally in the laboratory. The major objective of the test program is to measure the efficiency of reduction of NO_2 at concentrations of a few thousand parts per million in an inert gas diluent to threshold limit value levels. The catalytic reduction is accomplished with an admixture of CO to the NO_2 diluent gas mixture.

32271 **(BMFT-FB-T—82-194) Energy saving incineration of waste.** Meier zu Koecker, H.; Voegtlin, R. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 76p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750252.

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The widespread uneconomical high need of supplemental energy in the thermal afterburning of pollutants was to decrease by reaction and technical process control. In a laboratory and a pilot plant the mechanism and the dimension of the preoxidation of the pollutants in the heat exchanger were investigated. A temperature control system was developed and tested in the pilot plant. As the result, the preoxidation in the heat exchanger depends on the peculiarity of the pollutants and is inhibited by inactive walls with increasing of the specific surface. Active materials like copper only promote the oxidation of all pollutants in the low temperature region (200 to 600°C). Savings of supplemental energy about 25% are possible using process controlled auxiliary firing and combustion enthalpy of pollutants as a substitute for the supplemental energy. Further savings allow catalytical reactions only.

32272 (INIS-mf—7498, pp vp) **Performance of the individual fibers and the dynamics of the finite slab filter.** Astronov, A.; Gutfinger, C.; Pnueli, D. (Technion-Israel Inst. of Techn. Haifa. Faculty of Mechanical Engineering); Naot, D. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

32273 **(NP—3901187) Applying jet nozzle reactors to the absorption of pollution gases.** Vavatzanidis, A. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Chemieingenieurwesen). 11 Feb 1981. 125p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901187.

Portions are illegible in microfiche products; Thesis.

Pollution gas emissions interface with the natural equilibria of the atmosphere and influence the air quality. Sulphur dioxide and nitrogen oxides are the critical emission components. The absorbant (here tap water) is continuously cycled in jet nozzle reactors which are used to absorb gases in liquids. Absorption liquid and gas are introduced into the reactor by a binary material nozzle with connected pulse exchange room (I-space). The main pulse of the liquid propulsion jet is converted in the comparitively small I-space resulting in good mixing and distribution of the gas phase in the shear rate between shear gradient and the liquid freely sucked into the I-space. The jet nozzle reactor presented here for practical use is found to be suitable for nitrogen oxide absorption in tap water. The advantages are the large conversions and the extremely small space needed.

32274 **(PB—83-134866) Smelter emission controls. The impact on mining and the market for acid. Open file report (final) 1 Oct 80-31 Dec 81.** Rieber, M.; Asante, E.M.L.; Hiraki, T.; Jennings, D.B.; Knutson, D.R. (Arizona Univ., Tucson (USA)). Mar 1982. 685p. NTIS, PC A99/MF A01.

This report presents an overview of Federal and State regulations affecting SO_2 emissions from nonferrous metal smelters. Compliance strategies provide a study basis and individual smelter requirements are reviewed. The report contains an overview of U.S. copper reserves and quality; mine and smelter productivity; facility ownership, capacity, and production; and acid and concentrate transport costs. Prior copper pricing practices were analyzed with respect to industry structure, current competitiveness, solvency, and possible response to Federal aid.

32275 **(PB—83-155309) Control of sulphur oxides from coal combustion.** Morrison, G.F. (International Energy Agency Coal Research, London (UK)). Nov 1982. 107p. NTIS, PC $18.00/MF$18.00.

This review discusses and compares the technologies for the control of the emissions of sulphur dioxide, SO_2, from the combustion of coal at three stages of the combustion mainly by the use of SO_2 sorbents in fluidized bed combustors (FBC); and after combustion by flue gas desulphurization (FGD) processes. Physical, chemical and microbiological coal desulphurization processes are discussed. The section covering SO_2 removal during fluidized bed combustion concentrates on methods of increasing the utilization of sorbents. These include: pretreatment of sorbent; post-sulphation treatment of sorbent; and modification of the operating parameters of a fluidized bed combustor. Both wet and dry FGD processes are described. Wet processes are sub-categorized as regenerable and non-regenerable. Disposal of FGD waste is discussed. Dry processes include those based on dry injection, spray dryer and dry adsorption techniques. It is concluded that FGD processes currently provide the only means of consistently removing high percentages (more than 90%) of potential SO_2 emissions from coal combustion. FBC has the potential to equal these removal rates when the technology becomes available for power generation. Practical restrictions limit the amount of sulphur removed by physical desulphurization processes to about 50 wt% of the total pyritic sulphur in coal. Organic sulphur is not removed. Chemical and microbiological desulphurization processes are not yet commercial.

32276 **Radiation treatment for removing SO_2 and NOsub(x) from exhaust gases.** Kawamura, K. (Ebara Mfg. Co. Ltd., Tokyo (Japan)); Shui, V.H. (Avco-Everett Research Lab., Inc., Everett, MA (USA)). pp 197-215 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/104; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Exhaust-gas treatment by electron-beam irradiation is one of the most effective methods for simultaneously removing SO_2 and NOsub(x). The electron-beam gas-treatment process consists of adding a small amount of NH_3 to the exhaust gas, irradiating the gas by electron-beam, forming ammonium salts by reactions of NOsub(x) and SO_2 with NH_3, and collecting the salts by a dry electrostatic precipitator or a bag-house. The process has several advantages compared with conventional processes: (1) simultaneous removal of SO_2 and NOsub(x); (2) simple dry process, easy to operate; (3) enhanced removal of particulates; (4) low capital and operating cost; (5) no stack gas reheat; (6) pollutants and added NH_3 are converted to commercial agricultural fertilizer. A pilot plant, with a maximum gas flow-rate of 10,000m^3/h NTP (6000 standard ft^3/min) for demonstrating the process performance, was built and operated at an iron works in Japan where high removal efficiencies were obtained for SO_2 concentrations of between 200 and 2000ppm, and NOsub(x) concentrations of between 160 and 620ppm. A cost comparison was performed by Avco together with an engineering firm in the United States of America. Using test results from the 10,000m^3/h NTP pilot plant and electron-beam cost projections given by its manufacturer, the cost study shows that the electron-beam process costs about 40% less than the wet lime/limestone process. The reaction mechanism of SO_2 and NOsub(x) removal and some results of related basic research are also described.

32277 **Influence of low electrical field strengths on radiation-induced SO_2 conversion in gases.** Leonhardt, J.W.; Boes, J.; Krueger, H.; Popp, P. (Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung). pp 273 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/26P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

43 PARTICLE ACCELERATORS

4301 Design, Development, And Operation

REFER ALSO TO CITATION(S) 32832

32278 **(AD-A—123659/5) Energy scaling laws for the racetrack induction accelerator. Final report.** Mondelli, A.A.; Roberson, C.W. (Naval Research Lab., Washington, DC (USA)). 29 Dec 1982. 31p. NTIS, PC A03/MF A01.

A high-current, cyclic electron accelerator, capable of accelerating several kiloamperes of electron current is described. The accelerating elements of the device are linear induction modules which match well to high-current operation. A racetrack configuration is utilized to return the electrons to the induction modules, thereby providing electron acceleration to an energy given by the gap voltage multiplied by the number of electron transits during the total pulse duration of the induction modules.

32279 **(AECL—7260) Review of prospects for an accelerator breeder.** Fraser, J.S.; Hoffman, C.R.; Schriber, S.O.; Garvey, P.M.; Townes, B.M. (Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.). Dec 1981. 46p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700358.

The scientific feasibility, engineering practicability and economic prospects for an Accelerator Breeder are reviewed. The scientific feasibiliity of high power accelerator components rests on a firm basis as a result of technical advances made in recent years but there is a need to combine all components in a demonstration model working under realistic conditions. The engineering practicability of Accelerator Breeder components should be tested in a staged development culminating in a full-scale demonstration plant. The economic assessment depends on calculations of allowed and estimated capital costs of an Accelerator Breeder for a CANDU system operating on the Th-U fuel cycle. The results indicate that the ratio of estimated to allowed capital cost is approximately 3.5

for a breeder with a 2% enriched uranium metal blanket and for separated U235 valued at 48 $/g.

32280 **(ANL-HEP-CP—83-11) Conceptual design of a 1.1-GeV 500-μA fast-cycling proton synchrotron.** Cho, Y.; Crosbie, E.; Khoe, T.; Kustom, R.; Martin, R.; Norem, J.; Praeg, W.; Thompson, K.; Wuestefeld, G. (Argonne National Lab., IL (USA)). Mar 1983. Contract W-31-109-ENG-38. 4p. (CONF-830311—107). NTIS, PC A02/MF A01. Order Number DE83010748.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Portions are illegible in microfiche products.

A very high intensity proton synchrotron system which could be used for a pulsed spallation neutron source and low energy neutrino and meson physics facility is designed. The synchrotron would accelerate 200 MeV protons to 1.1 GeV with a repetition rate of 50 pulses per sec. The number of protons per pulse is 6.3 x 10^{13}, resulting in an average proton current of 500 μA. In order to accommodate the high intensity considerable attention was directed toward minimizing beam loss, controlling space charge forces, and eliminating beam instabilities. Special features of the conceptual design include H^- charge exchange injection, a guide field flat-bottom of 1.5 msec to facilitate low-loss injection and capture, 15 msec acceleration period, and 3.5 msec for reset of the guide field. A separated function lattice consists of normal cells, dispersion suppressor cells, and matching cells. It provides sufficient straight section length to accommodate a fairly long rf system. A low impedance rf system (cathode-follower) is considered in order to overcome strong beam loading effects in the cavities. Rapid bunch shaping is employed at the end of acceleration to produce pulses of 200 nsec duration for possible neutrino experiments. The transverse acceptances used in the design are: epsilon/ sub H/ = 500.π mm mr and epsilon/sub V/ = 300 π mm mr.

32281 **(CONF-821123—39) Reduction of ripple voltage in a dynamitron.** Langsdorf, A. Jr. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83010782.

From 7. conference on the application of accelerators in research and industry; Denton, TX, USA (8 Nov 1982).

We determined that a precise neutralization of the RF ripple voltage on the high-voltage terminal of a Dynamitron has previously been prevented by a nonegligible phase shift of RF currents in the two halves of the ~ 100-kHz class C oscillator tank circuit, which is actually constituted of two slightly unequal high-Q coupled circuits because it has two ground points: the inescapable center-tap-ground in the capacitive legs and a center-tap-ground lead to the induction coil. The latter is needed to prevent damage by flashover transients; equivalent to its removal was the adjusting of RF ground return current to a null by aid of a current transformer on this lead and the suitable adjusting of trimmer capacitance. While the phase shift was thus held to a null, the actual ripple amplitude on the hv terminal was minimized by adjusting additional trimmer capacitances installed in the terminal of the machine. Then p/p 100-kHz ripple at 2-MV dc output was reduced to about 50V and RMS resolution by (p,γ) resonance threshold data near 1 MV was about 250 V. The limit to resolution has various causes including mechanical vibrations and unbalanced harmonics of the RF.

32282 (CONF-8010206—Vol.2, pp vp) **Present status of the Gatchina synchrocyclotron with the proton energy of 1 GeV.** Abrosimov, N.K.; Dmitriev, S.P.; Eliseev, V.A.; Kulikov, A.V.; Mironov, Yu.T.; Mikheev, G.F.; Ryabov, G.A.; Chernov, N.N. (AN SSSR, Leningrad. Inst. Yadernoj Fiziki). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of modernization and operation of the 1 GeV proton synchrocyclotron during a period from 1970 to 1980 are presented. As a result of installation of a three-electrode electrostatic focusing system the ejected proton beam intensity increases from 0.1 to 1 μA. The coefficient of time beam filling is increased from 1.4% to 50%. A pulsed neutron channel and a neutron time-of-flight spectrometer, a medical proton channel a combined π-μ-meson channel are put into operation. Laboratories for studying short-lived isotopes far from the β stability band, a proton therapy building and a computer centre equipped with two EC-1030 type computers have been built. The accelerator operating time is increased up to 6000 h per year. The external and internal shieldings have been reinforced, that permits to reduce the neutron exposure dose rate from 10 mrem/h down to 0.1 mrem/h.

32283 (CONF-8010206—Vol.2, pp vp) **Investigations on the increase of power of linear induction accelerators for application in the different fields of industry.** Anatskij, A.I.; Vakhrushin, Yu.P.; Gagen-Torn, V.K.; Gusev, O.A.; Zhestkov, S.N.; Ehrmel, V.E. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Two circuits of switching of thyratron for investigating possibility of increasing the pulse repetition frequency and evaluation of performances of the accelerating system of linear induction accelerators (LIA) are studied aiming at power increase of LIA. It is stated that the A operation expenditures are determined mainly by the cost of the spent electric power. The maximum efficiency and the beam minimum cost of kW-hour is within the range of microsecond pulse duration with the increase of pulse repetition frequency. The efficiency and the beam cost of kW- hour at pulse duration from 0.15 to 1 μs are essentially changed and at the pulse duration more than 1 μs it is slightly changed, the latter is explained by the fact that magnetization current of LIA cores within this range are slightly changed. Further increase of pulse repetition frequency up to the limiting value of several hundred kHz is possible at developing the production of the designed gas discharge switches of the tacytron type.

32284 (CONF-8010206—Vol.2, pp vp) **High-voltage electron accelerators for radiation processes.** Al'bertinskij, B.I.; Vojnalovich, O.A.; Glukhikh, V.A.; Ivanov, A.S.; Svin'in, M.P.; Fedotov, M.T. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The main operation characteristics of the "Aurora-2" and the "Aurora-3-M-1" high-voltage electron accelerators intended for the use in radiation-technological processes are presented. The dependences of relative cost of the beam on the accelerator power are revealed. The design parameters of the improved "Electron" and "Aurora" type accelerators are given. The evaluations show that the cost of 1 kW power of an electron beam of the 2.5-4 MeV accelerators of 50-100 kW power correspond to the parameters of foreign accelerators of this class. It was noted that the number and total power of commercial accelerators in the USSR in recent years increased more rapidly than in the USA and other developed capitalist countries. Shown is the necessity of developing a common program of radiation equipment introduction in the whole country comprising the arrangement of a specialized and powerful base of accelerator manufacturing.

32285 (CONF-8010206—Vol.2, pp vp) **Cyclotrons for applied purposes.** Glukhikh, V.A.; Vakhrushin, Yu.P.; Vorogushin, M.F.; Malyshev, I.F.; Stepanov, A.V. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

A set of cyclotrons comprising six types of facilities covering the energy range from 6 to 220 MeV is presented for unification of the units and systems of cyclotrons for applied purposes. Beam parameters and the performances of the cyclotrons are given. It is shown that the cyclotrons can be divided in three groups. The first group includes cyclotrons for the production of radioactive isotopes. The second group comprises cyclotrons for the conduction of element analysis of the substance composition and study of

wearing ageing and corrosion processes of machine and mechanisms. Cyclotrons intended for the purposes of beam therapy make up the third group. Development of the cyclotrons in accordance with this set makes it possible to reduce time of designing, construction and putting into operation and to decrease their cost and expenses for operation.

32286 (CONF-8010206—Vol.2, pp vp) **Increasing breakdown strength of the support column of high-voltage accelerators.** Rezvykh, K.A.; Romanov, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Calculation results of strength of electric field of the EG-2.5 electrostatic accelerator for the support column with electrodes of circular and elliptical transverse cross sections are presented. Conducted is the choice of constructing the column under the condition that the dimensions of the tank, high-voltage electrode, step between the sections and internal diameter of the column electrodes are not changed. The potential at the high-voltage electrode equals 2.5 MV while the average longitudinal gradient of the column field equals 1.25 MV/m. The support insulation column of the high-voltage accelerator screened by rings with transverse cross section in the form of orientation oval in some accelerators promotes obtaining higher operating voltage and at the same time increase of operation reliability at the rest unchanged dimensions of the plant because the probability of break-down between the support column and the tank wall decreases. The latter is especially significant for most high-energy accelerators as well as for accelerators used in national economy.

32287 (CONF-8010206—Vol.2, pp vp) **4 MeV small-sized betatron for defectoscopy.** Bojko, D.A.; Burov, G.I.; Mynka, A.A.; Pushin, V.S.; Romanov, V.V.; Filimonov, A.A.; Chakhlov, V.L.; Chakhlov, G.L.; Shtejn, M.M. (Tomskij Politekhnicheskij Inst. (USSR). Nauchno-Issledovatel'skij Inst. Ehlektronnoj Introskopii). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of improvement of the 4 MeV betatron aiming at the increase of bremsstrahlung exposure dose rate and decrease of betatron dimensions are presented. As a result of impovement the weight of the irradiator is reduced up to 40 kg and the exposure dose rate of radiation increases up to 2.5×10^{-6} A/kg. Investigation of the radiographical control method of materials and samples by means of betatron has shown that the best sensitivity is attained at 80-100 mm thickness of steel samples. The maximum thickness of steel transillumination at the sensitivity not less than 1-3% makes up 150 mm. The time of 150 mm steel transillumination does not exceed 15 minutes. Small dimensions of the focus spot and absence of the phenomenon of electron damp on the target permit to control the samples at small focus distances without essential increase of the image non-definition of the roentgenogram.

32288 (CONF-8010206—Vol.2, pp vp) **Study on a superconducting diaphragmatic waveguide.** Vakhrushin, Yu.P.; Volchkov, O.V.; Klinov, A.P.; Komkov, A.A.; Orlov, A.K.; Smirnov, V.L.; Sokolov, B.A.; Sorokin, E.K.; Chikatash, I.A. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of investigations of a superconducting diaphragmatic waveguide containing two full cells and two semicells and designed for operation in the standing wave mode on π-type oscillations at the 0.7 s phase velocity and 2.8 GHz frequency are presented. The waveguide length is 112 mm. The waveguide is made of niobium with successive chemical polishing. The waveguide section is tested at 4.2 K temperature. The value of a proper quality factor varies within the $(3\text{-}5) \times 10^7$ limits. It falls down to 5×10^5 at a sharp increase of input power. The maximum energy gain of an electron beam injected into the waveguide at 10 W power is obtained at 50 kV voltage of the electron source and is equal to 150 keV.

32289 (CONF-8010206—Vol.2, pp vp) **Accelerating system of a multibeam ion accelerator.** Gavrilov, N.M.; Gavrilova, R.K.; Gromov, E.V.; Nikitin, I.B.; Stepanov, S.S.; Shal'nov, A.V.; Kushin, V.V.; Plotnikov, S.V.; Fedotov, P.A. (Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of development and investigations of an accelerating structure of a multibeam ion accelerator are presented. The principle of asymmetric phase-alternating focusing is realized in the accelerating structure, and the intensity increase of accelerated beams is achieved due to increasing the number of accelerating channels and decreasing the operating frequency. The accelerating structure contains a cylindrical resonator, inside which two potential electrodes are placed parallel to the longitudinal axis, each of electrodes is made of six parallel conductors displaced at 120 deg with respect to each other and at 60 deg in relation to conductors of another electrode: those six electrodes are combined into a combined rigid construction. For measuring high-frequency parameters of the structure a functional model of an accelerating section for acceleration of seven parallel beams of argon single-charged ions is constructed. The functional model length is 0.8 m, the resonator diameter is 0.3 m, the operating frequency is 50.6 MHz. As a result of measurements the 22 kOhm/m shunting impedance is obtained. The calculation results of the ion dynamics for a rectangular distribution of an accelerating field in gaps are presented.

32290 (CONF-8010206—Vol.2, pp vp) **Synchronization system of the SILUND experimental high-current linear accelerator.** Glejbman, Eh.M.; Dolbilov, G.V.; Lebedev, N.I.; Pilyar, N.V.; Sumbaev, A.P.; Tarasov, V.V. 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

A synchronization system of an experimental facility the SILUND- 2 linear induction accelerator is described. The system is constructed with provision for the following requirements: a possibility of organization of channels operation corresponding with a temporary program of operation of the accelerator units and systems, a possibility of reconstruction and fast development, power efficiency. The apparatus part of the system is made in the CAMAC standards. It consists of two branches - control and amplifiers - pulse shapers. The control branch contains 16 independent channels of controlled time delay, retuned in the 0-9.9999 ms range with the 100 ns step and a microprocessor controller. Controlling of channels is realized by comands from a display, indication of the channel state is carried out on a TV indicator.

32291 (CONF-8010206—Vol.2, pp vp) **Methods for stabilization of Rf fields in the proton linear accelerator - injector into the IHEP proton synchrotron booster.** Mal'tsev, I.G. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The methods and schemes of stabilization of beam perturbation in a linear proton accelerator designed for acceleration of a proton beam at 100-150 μA current up to 30 MeV energy are described. To provide beam acceleration in the initial part of accelerator up to 2 MeV energy a system with nonlinear HF countercoupling is developed. The calculated speed of response of the system is 0.5-0.7 μs. For compensation of beam perturbations in end sections of the accelerator two separate autocompensation systems with parametric HF countercoupling according to a reflected wave are designed. The response of this system is 0.1-0.15 μs.

32292 (IPNO—1981, pp P.1-P.4) **5. Accelerator project.** [nd]. (In French). NTIS (US Sales Only), PC A13/MF A01.

In Annual report 1981 (1 Sep 1980 - 31 Aug 1981).

The design studies of a new accelerator expected to be in operation at Institut de Physique Nucleaire Orsay in 1988-1989 are reproted.

32293 **An accelerator design study.** Wilson, R.R. (Dept. of Physics, Columbia Univ., New York, NY 10027). pp 405-458 of Techniques and concepts of high-energy physics. Ferbel, T. New York, NY; Plenum (1981).

This brief article outlines the conclusions of a discussion on accelerator design that took place at the St. Croix ASI. The aim of the discussion was to bring to light some of the technical and politico-financial problems of quickly building a cheap facility that would have a place in the context of currently available accelerator facilities. The problems of funding and of designing a machine that fills a gap in the area of study and the study site are foremost in the discussion.

32294 **(ORNL-tr—4972) SIS: an accelerator installation for heavy ions of high energy.** (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.); Oak Ridge National Lab., TN (USA)). [nd]. Contract W-7405-ENG-26. Translation of GSI—82-2, November 1981. 224p. NTIS, PC A10/MF A01. Order Number DE83011733.

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The two major sections of the report cover the scientific experimental program and the accelerator installation. Topics covered in the first include: heavy ion physics in the medium energy region; nuclear physics at relativistic energies; atomic physics loss and capture cross sections for electrons; spectroscopy of few-electron systems; atomic collision processes; biological experiments; nuclear track techniques in biology; and experiments with protons and secondary radiation. The second includes: concept for the total installation; technical description of the SIS 12; technical description of the SIS 100; status of the UNILAC injector; development options for the SIS installations; properties of the heavy ion beam; and structural work and technical supply provisions. In this SIS project proposal, an accelerator installation based on two synchrotrons is described with which atomic nuclei up to uranium can be accelerated to energies of more than 10 GeV/μ. With the SIS 12, which is the name of the first stage, heavy ion physics at intermediate energies can be pursued up to 500 MeV/μ. The second stage, a larger synchrotron, the SIS 100, has a diameter of 250 m. With this device, it is proposed to open up the domain of relativistic heavy ion physics up to 14 GeV/μ (for intermediate mass particles) and 10 GeV/μ (for uranium). (GHT)

4302 Beam Dynamics, Field Calculations, And Ion Optics

32295 **(ANL-HEP-CP—83-09) Lattice for a 1.1-GeV 500 μA fast-cycling proton synchrotron.** Cho, Y. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 2p. (CONF-830311—109). NTIS, PC A02/MF A01. Order Number DE83010771.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

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A very-high-intensity proton synchrotron lattice has been designed for a spallation neutron-source system. The synchrotron is to accelerate a beam of 6.25×10^{13} protons from 200 MeV to 1100 MeV in 15 msec. One of the important concerns for high-intensity, high-rep-rate (50 pulses/sec) machines is stability of the beam. Considerations of the transverse space-charge limits and the transverse-stability criterion favor a high-tune machine over a low-tune machine of the same circumference. For these reasons, we made the tune as high as possible by making the cell length as short as possible. The lattice proposed here consists of four sectors, and each sector is made up by three FODO normal cells, four dispersion suppressor cells, and four matching and straight section cells. Then the total of 44 cells with approximately 90°/cell phase advance would make the natural tune of the machine to be near 11.

32296 **(ANL-HEP-CP—83-13) Slot-coupled beam-signal-pickup development at Argonne National Laboratory.** Simpson, J.D.; Kramer, S.L.; Suddeth, D.; Konecny, R. (Argonne National Lab., IL (USA)). Mar 1983. Contract W-31-109-ENG-38. 3p. (CONF-830311—108). NTIS, PC A02/MF A01. Order Number DE83010772.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

The overall performance of slot couplers, at least for frequenciees below 2 GHz, can probably not match that of stripline based pickups. A measured, typical coupling at 2 GHz correesponds to about 6 to 7 ohms/slot-pair and produces about 8° phase shift/slot on the TEM line. Suppose a 12 to 14 slot array were constructed with these parameters. It would have a total 90° phase shift at about 1.7 GHz, and the coupling would be about 80 ohms at 2.0 GHz. Such an array would be 30 cm long. In a 10 m long straight section, one could place perhaps 25 such modules. After power adding, the net coupling would be about $80 \times \sqrt{25} = 400$ ohms. This is 75% of the value which can be obtained by stripline structures (e.g. the FNAL Tevatron-I design). On the other hand, stripline structures may be difficult to construct for, let's say, a 4 to 8 GHz band. Slot coupled devices may then prove to be the more attractive choice. Slot couplers for these higher frequencies will be the subject of our R and D program at this time in the future.

32297 (CONF-8010206—Vol.2, pp vp) **Effects of conditions for beam acceleration and extraction on the beam parameters in a cyclotron with phase selection.** Belyakov, V.A.; Vaganov, A.K.; Vasil'ev, V.S.; Gordin, V.I.; Litunovskij, R.N.; Minyaev, O.A. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of experimental studies on a system with radial phase selection, consisting of two collimators of a unishutter construction with adjustable width of a shutter fixed at the fifth and sixth orbits of the 240 cm isochronous cyclotron at different azimuths, are presented. A durable phase stability of a beam bunch is studied. It is shown that when the automatic phase control system is turned on, slow drifts do not exceed 1.5 deg, but when the selection system is turned off phase drifts within the limits up to 23 deg are observed. The start-up of the automatic beam phase control at the final radius of acceleration considerably increases the current stability of an ejected ion beam. Introduction of the phase selection system permits improvement of the internal beam quality for adjustment of the width and position of the phase band with respect to the equilibrium phase. As a result the beam extraction coefficient is reached about 70%, beam radial emittance is not more than 18 mmxmrad, the vertical - 20 mmxmrad. Beam energy spread is not more than 0.3% of the energy gain per turn.

32298 (CONF-8010206—Vol.2, pp vp) **Analysis of the particle dynamics in linear accelerators for electron microscopy.** Orlov, A.K. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of the analysis of the electron beam dynamics in superconducting linear accelerator of the energy variable within the 2.5-10 MeV range and of 1O μA average current of the beam are presented. The basic elements of the accelerator are as follows: autoemission RF-source of electrons, electrostatic lens, decelerating and bunching resonators, injection and the main accelerating sections, excited in the mode of standing waves on the π-type wave compensation resonator, analyzing, magnet. The calculation of the beam dynamics is based on the matrix method used for the analysis of magnetic systems. The calculation spectrum of electrons of 5×10^{-6} width at 10^7 A/cm^2 beam brightness is obtained at the accelerator outlet at the energy of 10 MeV.

32299 (CONF-8010206—Vol.2, pp vp) **Monitoring system for measuring timing characteristics of cyclotron ion beams.** Arzumanov, A.A.; Voronin, A.M.; Gor'kovets, M.S. (AN Kazakhskoj SSR, Alma-Ata. Inst. Yadernoj Fiziki). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The description and block-diagram of a monitoring system for measuring time response of an internal and an external ion beam of an isochronous cyclotron using stroboscopic facilities are presented. A stroboscopic oscillograph operating in a driven sweep mode is a master oscillator. A variable-capacitance transducer (a rectangular electrode of the 9 cm^2 area with the 8 deg angular extent installed at an appropriate radius) is a monitor for determining an instantaneous azimuthal density of an accelerated particle bunch. The proposed diagnostics system without beam interruption provides investigation of quick processes in an accelerating chamber with the $1x10^{-9}$ s time resolution at 0.1% nonlinearity of time transformation. For measuring parameters of an ejected beam of accelerated ions variable-capacitance transducers, having the shape of a copper cylinder of the 50 mm diameter and 100 mm length, are used. The attained sensibility of beam current measurements is 1 nA at the approximately 10 coefficient of the signal/noise relation.

32300 (CONF-8010206—Vol.2, pp vp) **Method for extremal control of the beam parameters in charged particle accelerators.** Vasil'ev, N.D.; Kuznetsov, A.V.; Mozin, I.V.; Shelekhov, V.A. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The method of extremal control of charged particle beam parameters is suggested for the solution of the optimization problem of the IHEP booster operation mode. Motion along the estimation of drift direction with simultaneous adaptation to the value of drift rate is organized in the suggested method of extremal control. It is assumed that trajectory of the drift extremum can be approximated by the piecewise-linear function. Estimation of the drift direction is exercised on the base of fixation of two consequent positions of the extremum in the control space. The identification of the drift-direction are introduced in the algorithm of tracing the extrenum drift. Investigation of the method on the test two-dimensional square surface has shown that the method provides drift tracing within the rate of 0.01 a deg - 2 a deg where a deg - the initial working step of the stochastic approximation method. The average deviation does not exceed 0.7 a deg, and the accuracy of adaptation to the value of drift rate 10^{-3} K.

32301 (FERMILAB/TM—1188) **Change in dispersion function from field-gradient errors.** Ohnuma, S.; Takayama, K. (Fermi National Accelerator Lab., Batavia, IL (USA)). 25 Apr 1983. Contract AC02-76CH03000. 9p. NTIS, PC A02/MF A01. Order Number DE83012020.

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We consider changes in the momentum dispersion function induced by field gradient errors of quadrupole magnets located around a ring.

32302 (FERMILAB/TM—1189) **Design parameters for a lithium lens as antiproton collector.** Lennox, A.J. (Fermi National Accelerator Lab., Batavia, IL (USA)). Mar 1983. Contract AC02-76CH03000. 4p. NTIS, PC A02/MF A01. Order Number DE83012021.

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Maxwell's equations with appropriate boundary conditions are solved for a pulsed cylindrical conductor. The results are applied to the lithium lens used as an antiproton collector for the Fermilab pp collider. The magnetic field is expressed as a function of radial distance and time. The time corresponding to maximum linearity is calculated. A method for measuring the current density at the surface is discussed and the Joule heat produced per pulse is calculated.

32303 (INS-R—284) **Beam transport calculations for the EN tandem installation.** Sparks, R.J. (Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences). Dec 1980. 29p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700361.

Transport of a charged particle beam through the new EN tandem accelerator installation of the Institute of Nuclear Sciences has been analysed using simplified mathematical models. The purpose is to identify the factors affecting transmission of the beam, and to arrive at a design for the system to inject the beam into the accelerator.

32304 (ITEF—116(1981)) **Method for magnetic field calculation using pole configuration and restoration of field configuration by results of magnetic measurements.** Bol'shakov, A.E.; Gol'din, L.L. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1981. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700362.

The method for calculation of electromagnet fields using magnet pole configuration is presented. The magnetic potential is approximated by the series termwise satisfying the Laplace equation. Coefficients at series terms are determined by the least-square method at boundary conditions. The field perturbations caused by magnetic poles saturation are taken into account by means of correction functions, coefficients at which are determined by magnetic measurements in several points. The calculation results are compared with the experiment data. The suggested method is suitable for calculation magnetic systems with a complex pole configuration.

32305 (JINR-R—11-81-796) **Beam bunch self-field calculation based on the first charge density moments.** Bobyleva, L.V.; Kazarinov, N.Yu.; Perel'shtejn, Eh.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods). 1981. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700367.

The problem of electric self-field calculation based on the first charge density moments is discussed for a plane layer and cylinder with azimuthal symmetry. To solve the problem the Gauss quadrature formula is use. Test calculations on a computer show a good accuracy when only the first charge density moments are used.

32306 (LBL—13241) **EBQ code: transport of space-charge beams in axially symmetric devices.** Paul, A.C. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 305p. NTIS, PC A14/MF A01. Order Number DE83011629.

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Such general-purpose space charge codes as EGUN, BATES, WOLF, and TRANSPORT do not gracefully accommodate the simulation of relativistic space-charged beams propagating a long distance in axially symmetric devices where a high degree of cancellation has occurred between the self-magnetic and self-electric forces of the beam. The EBQ code was written specifically to follow high current beam particles where space charge is important in long distance flight in axially symmetric machines possessing external electric and magnetic field. EBQ simultaneously tracks all trajectories so as to allow procedures for charge deposition based on inter-ray separations. The orbits are treated in Cartesian geometry (position and momentum) with z as the independent variable. Poisson's equation is solved in cylindrical geometry on an orthogonal rectangular mesh. EBQ can also handle problems involving multiple ion species where the space charge from each must be included. Such problems arise in the design of ion sources where different charge and mass states are present.

32307 (LBL—14826) **Stochastic cooling of bunched beams from fluctuation and kinetic theory.** Chattopadhyay, S. (Lawrence Berkeley Lab., CA (USA)). Sep 1982. Contract AC03-76SF00098. 298p. NTIS, PC A13/MF A01. Order Number DE83012472.

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A theoretical formalism for stochastic phase-space cooling of bunched beams in storage rings is developed on the dual basis of classical fluctuation theory and kinetic theory of many-body systems in phase-space. The physics is that of a collection of three-dimensional oscillators coupled via retarded nonconservative interactions determined by an electronic feedback loop. At the heart of the formulation is the existence of several disparate time-scales characterizing the cooling process. Both theoretical approaches describe the cooling process in the form of a Fokker-Planck transport equation in phase-space valid up to second order in the strength and first order in the auto-correlation of the cooling signal. With neglect of the collective correlations induced by the feedback loop, identical expressions are obtained in both cases for the coherent damping and Schottky noise diffusion coefficients. These are expressed in terms of Fourier coefficients in a harmonic decomposition in angle of the generalized nonconservative cooling force written in canonical action-angle variables of the particles in six-dimensional phase-space. Comparison of analytic results to a numerical simulation study with 90 pseudo-particles in a model cooling system is presented.

32308 **(SAND—83-0559C) Particle simulations of collective effects in high-current accelerators.** Poukey, J.W.; Hughes, T.P.; Godfrey, B.B.; Campbell, M.M. (Sandia National Labs., Albuquerque, NM (USA); Mission Research Corp., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 5p. (CONF-830311—110). NTIS, PC A02/MF A01. Order Number DE83011281.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Particle simulation codes in two and three dimensions have become a standard theoretical tool in the study of many aspects of high current (kA range) accelerators. In this paper, we review some of the recent results obtained with these codes in the area of linear induction acceleration of electron beams. In particular, considerable progress is reported in the understanding of beam generation, oscillation control, accelerating-gap-induced instabilities, and extraction through a foil from a guide magnetic field.

32309 **Lectures in accelerator theory.** Month, M. (Brookhaven National Laboratory Upton, New York 11973). pp 405-458 of Techniques and concepts of high-energy physics. Ferbel, T. New York, NY; Plenum (1981).

In these three lectures, Month discusses topics in accelerator theory. The first lecture deals with the behavior of single particles in non-linear fields; the discussion focuses on beam-beam interaction of counter-rotating proton beams. The geometry and equations relevant to the problem are described, a model of the phenomena is given and the relevant aspects of resonance theory are discussed. The second lecture analyses the development of coherent motion on high-intensity particle beams. Using the case of a circular accelerator and a uniform beam current, the discussion proceeds from a description of the geometry of the induced field, as it relates to resistivity, to an account of the dispersion relation. in the final lecture, the theory of current accumulation is set forth in a discussion of the proton storage rings at the CERN facility. Following a review of current accumulation techniques, the incompressible fluid model is described, with the correspondent stacking equations and performance parameters given.

4303 Auxiliaries And Components

REFER ALSO TO CITATION(S) 32216, 32217, 32218, 32241, 32297, 32364

32310 **(AECL—7228) Linac injector options for a relativistic heavy ion synchrotron.** Schneider, H.R. (Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.). Jan 1982. 33p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700357.

A growing interest in medical uses for high energy heavy ion beams has led to two recent proposals to build dedicated medical heavy ion synchrotrons. Linear accelerators are generally preferred as injectors for synchrotrons, but in the case of heavy ions with relatively low charge to mass ratios, the required linacs are extremely large, and/or complex, low frequency structures. Cyclotrons were therefore initially proposed as the injectors for the medical synchrotrons. Recently a new radio-frequency quadrupole (RFQ) linac structure has been developed. Its excellent capture, beam transport and acceleration characteristics for low velocity ion beams makes it ideally suited as a heavy ion synchrotron injector either alone or in combination with a drift tube linac.

32311 **(AERE-R—9968) Stabilizer for the Harwell Tandem Van de Graaff.** Dolley, P.E.; Huxtable, G.B. (UKAEA Atomic Energy Research Establishment, Harwell. Nuclear Physics Div.). Feb 1981. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700359.

A new stabilizer for the Harwell Tandem is described. Its input signal is obtained either from a generating voltmeter measuring the terminal voltage, or from a logarithmic amplifier measuring the ratio of the currents falling on two plates which intercept the fringes of the output beam. The stabilizer provides an error signal which controls the terminal voltage by means of the existing corona-tube. In either mode the bandwidth of the error signal is approximately 600 Hz, which ensures that the overall performance in stabilizing fast fluctuations is limited entirely by the time constants of the tandem and the corona-tube.

32312 **(ANL-HEP-CP—83-01) Detectors and luminosity for hadron colliders.** Diebold, R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 14p. (CONF-8210113—3). NTIS, PC A02/MF A01. Order Number DE83010707.

From American Physical Society meeting on particles and fields; College Park, MD, USA (28 Oct 1982).

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Three types of very high energy hadron-hadron colliders are discussed in terms of the trade-off between energy and luminosity. The useable luminosity depends both on the physics under study and the rate capabilities of the detector.

32313 **(ANL-HEP-CP—83-12) Test facility for relativistic beam pickups.** Simpson, J.; Konecny, R.; Kramer, S.L.; Suddeth, D. (Argonne National Lab., IL (USA)). Mar 1983. Contract W-31-109-ENG-38. 4p. (CONF-830311—106). NTIS, PC A02/MF A01. Order Number DE83010750.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

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Calibration of beam signal pickup devices is an important but frequently difficult activity associated with the construction of accelerator systems. This is especially true for pickups used in stochastic cooling systems. Here the sensitivity and phase as functions of beam position are frequently critical, fundamental parameters of the system design. The most frequently used method for bench-calibration of pickup devices is that of passing a (usually thin) wire through the device. Electrical excitation of the wire, as a TEM line, simulates a beam and the transfer function of the device is measured directly. As many people have discovered, this procedure can frequently lead to incorrect predictions of pickup response to particle beams. These deficiencies have been eliminated in a facility at ANL which uses a relativistic electron beam to calibrate beam pickups. The facility is extensively used in the development of pickups, and is the primary calibration facility for pickups designed for the FNAL TeV-I antiproton source.

32314 **(BNL—32815) Pulsed Cs beam development for the BNL polarized H^- source.** Alessi, J.G. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 22p. (CONF-830348—1). NTIS, PC A02/MF A01. Order Number DE83010880.

From Conference on low energy ion beams-3; Loughborough, UK (28 Mar 1983).

A pulsed Cs^+ beam has been developed for use on a polarized H^- source. Cesium ion production is by surface ionization using a porous tungsten ionizer. While satisfactory current pulses (5 to 10 mA $\geq$ 0.5 ms) can be obtained, the pulse shapes are a sensitive function of the ionizer temperature and Cs surface coverage. The beam optical requirements are stringent, and the optics have been studied experimentally for both Cs^+ and Cs^0 beams. Computer calculations are in good agreement with the observed results. The

present source has delivered 2.6 mA of Cs^+ through the interaction region of the polarized ion source, and as much as 2.0 particle mA of Cs^0. A new source is being built which is designed to give 15 mA through the interaction region.

32315 **(BNL—32826) Triggering at high luminosity: fake triggers from pile-up.** Johnson, R. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 4p. (CONF-830224—5). NTIS, PC A02/MF A01. Order Number DE83010856.

From DPF workshop on collider detectors: present capabilities and future possibilities; Berkeley, CA, USA (28 Feb 1983).

Triggers based on a cut in transverse momentum (p/sub t/) have proved to be useful in high energy physics both because they indicte that a hard constituent scattering has occurred and because they can be made quickly enough to gate electronics. These triggers will continue to be useful at high luminosities if overlapping events do not cause an excessive number of fake triggers. In this paper, I determine if this is indeed a problem at high luminosity machines.

32316 **(BNL—32846) Advantages of spatial and temporal segmentation for detectors at high-luminosity e-w colliders.** Tannenbaum, M.J. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 2p. (CONF-830224—6). NTIS, PC A02/MF A01. Order Number DE83011356.

From DPF workshop on collider detectors: present capabilities and future possibilities; Berkeley, CA, USA (28 Feb 1983).

A major detector problem at high energy colliders independent of the luminosity is the ability to resolve particles inside jets. Only in very spacial cases, e.g., UAl W+- production with P/sub T/ = M/sub W//2 will enough of the signal be clear of jets, so that events with tracks in jets can be summarily rejected. Eventually, detectors will have to cope with tracks in jets. The high track density requires good track-pair resolution and efficiency, which implies wire chambers with drift distances of 2 mm or less, independent of the luminosity. The small drift distances required by the jet physics are very helpful at high luminosities since the maximum drift time of 40 nsec limits the pile-up to an average of 2 events at a luminosity of 10^{33} $cm^{-2}sec^{-1}$. The segmentation of calorimeters is also set by jet physics and the desire to resolve and measure collimated jets. Characteristics of some segmented detectors are briefly discussed. (WHK)

32317 **(BNL—32848) Operation of a high-P/sub T/ spectrometer arm at 10^{33} cm^{-2} sec^{-1} with particle identification.** Aronson, S.; Goldberg, M.; Holder, M.; Loh, E. (Brookhaven National Lab., Upton, NY (USA); Syracuse Univ., NY (USA); Gesamthochschule Siegen (Germany, F.R.); Utah Univ., Salt Lake City (USA)). 1983. Contract AC02-76CH00016. 4p. (CONF-830224—7). NTIS, PC A02/MF A01;1. Order Number DE83011357.

From DPF workshop on collider detectors: present capabilities and future possibilities; Berkeley, CA, USA (28 Feb 1983).

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In the Proceedings of the 1978 Isabelle Summer Study a high-pT spectrometer pair is presented as a prototype high-luminosity experiment. We consider here an updated version of this apparatus with the following questions in mind: (1) what rate capabilities are required to cope with L = $10^{33}cm^{-2}sec^{-1}$; (2) what segmentation is needed to deal with the particle densities expected in high pT jets; and (3) is the resulting device within the reach of present technology? The current version of the device and the expected rates are presented, and the rates and segmentation of the components are discussed. The results of calculations related to event pile-up and triggering are presented. The main conclusion, that particle identification appears to be quite feasible at these rates, is discussed in detail. (WHK)

32318 **(BNL—32870) Detecting heavy quarks.** Benenson, G.; Chau, L.L.; Ludlam, T.; Paige, F.E.; Platner, E.D.; Protopopescu, S.D.; Rehak, P. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 15p. (CONF-830224—8). NTIS, PC A02/MF A01. Order Number DE83011365.

From DPF workshop on collider detectors: present capabilities and future possibilities; Berkeley, CA, USA (28 Feb 1983).

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In this exercise we examine the performance of a detector specifically configured to tag heavy quark (HQ) jets through direct observations of D-meson decays with a high resolution vertex detector. To optimize the performance of such a detector, we assume the small diamond beam crossing configuration as described in the 1978 ISABELLE proposal, giving a luminosity of 10^{32} cm^{-2} sec^{-1}. Because of the very large backgrounds from light quark (LQ) jets, most triggering schemes at this luminosity require high P/sub perpendicular to/ leptons and inevitably give missing neutrinos. If alternative triggering schemes could be found, then one can hope to find and calculate the mass of objects decaying to heavy quarks. A scheme using the high resolution detector will also be discussed in detail. The study was carried out with events generated by the ISAJET Monte Carlo and a computer simulation of the described detector system. (WHK)

32319 **(CONF-811145—19) Neutron-irradiation facilities at the intense pulsed-neutron source.** Birtcher, R.C.; Blewitt, T.H.; Kirk, M.A.; Scott, T.L.; Brown, B.S.; Greenwood, L.R. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 20p. NTIS, PC A02/MF A01. Order Number DE83010600.

From International conference on neutron irradiation effects; Argonne, IL, USA (9 Nov 1981).

Among the accelerator-based neutron sources presently in operation, the highest-flux source is the Intense Pulsed Neutron Source (IPNS), a user facility at Argonne. Neutrons in this source are produced by the interaction of 500-MeV protons from a synchrotron with either of two ^{238}U target systems. In the Radiation Effects Facility (REF), the ^{238}U target is surrounded by Pb for neutron generation and reflection. The REF has three separate irradiation thimbles. Two thimbles provide irradiation temperatures between that of liquid He and several hundred degrees centigrade. The third thimble operates at ambient temperature. In the Neutron Scattering Facility, the second ^{238}U target is surrounded by Be, and there are two irradiation thimbles that operate at ambient temperature. The energy distribution of the neutron flux has been measured. The spatial distribution of the neutrons within the REF irradiation thimbles has been determined.

32320 **(CONF-821046—4) Sandwich targets for heavy-ion experiments.** Thomas, G.E. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83009729.

From 11. world conference of the International Nuclear Target Development Society; Seattle, WA, USA (6 Oct 1982).

Techniques for producing sandwich targets such as Gd + Pb are described. Better contact between the materials is sometimes assured by evaporating one material onto the other rather than by rolling the two together. Experimental data using both types of targets will be shown.

32321 **(CONF-821123—40) Overview of research at NBS using synchrotron radiation at SURF-II.** Ederer, D.L.; Madden, R.P.; Parr, A.C.; Rakowsky, G.; Saloman, E.B.; Copper, J.; Stockbauer, R.; Madey, T.E.; Dehmer, J.L. (Argonne National Lab., IL (USA); National Bureau of Standards, Washington, DC (USA)). 1982. Contract W-31-109-ENG-38. 6p. D. Order Number DE83010760.

From 7. conference on the application of accelerators in research and industry; Denton, TX, USA (8 Nov 1982).

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The National Bureau of Standards (NBS) Synchrotron Ultraviolet Radiation Facility (SURF-II) is used in conjunction with several high throughput monochromators to study the interaction of vacuum ultraviolet photons with solids and gases. Recent work has been concerned with the photon stimulated desorption of atomic and molecular ions from surfaces, with the effect of electric fields on molecular photoabsorption and with the study of molecular photoionization by angle resolved photoelectron spectroscopy. These research programs yield new information about molecular bonding at surfaces, molecular dynamics near ionization thresholds, and the

coupling of the electronic and nuclear motion near resonances in molecules. In addition to these programs in basic research SURF-II is used for the calibration of transfer standard detectors over a photon energy range 20 to 250 eV. Calibration of monochromator systems is achieved over the photon energy range 5 to 250 eV by using the now calculable spectral intensity radiated by the electrons, which are confined in a nearly circular orbit.

32322 (CONF-8010206—Vol.2, pp vp) **Axial injection system of the Kiev 240-cm isochronous cyclotron.** Linev, A.F.; Val'kov, A.E. (AN Ukrainskoj SSR, Kiev. Inst. Yadernykh Issledovanij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The U=240 cyclotron axial injection system intended for transport of polarized ion beams with emittance of 1000 mm mrad is described. Before the input into the focusing channel the polarized ions pass through the system of single lenses intended for matching of source emittance and acceptance of the focusing channel. Channel switching to different sources is performed by the upper electrostatic deflector. Three electrostatic quadrupole triplets are the focusing elements of the transport channel. Lenses of each triplet have the aperture of 5 cm and 12 cm length of electrodes. Distance between the lenses in the triplet makes up 2.5 cm. A buncher permitting to 4-6 times increase the current density of polarized ions in bunches is installed between the second and the third triplet. The experimental investigations of the axial injection system on the full size functional model are finished at present. The construction of the injection equipment is finished. In the near future the injector will be mounted in the accelerator.

32323 (CONF-8010206—Vol.2, pp vp) **Choice of the reliability factors of high-voltage accelerators for industrial application.** Al'bertinskij, B.I.; Svin'in, M.P.; Studennikov, Yu.S.; Tsepakin, S.G. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Statistical data on failures and preventive maintenance of the two "Aurora" high-voltage accelerators during operation are presented. The analysis of statistical data has shown that most failures are connected with accelerator power supply and control systems. The most reliable way of eliminating the number of failures of the equipment of power supply and control systems is the choice of articles operating in lightened modes and by providing optimal redundancy. It is economically advisable to increase the reliability of accelerators only by enchancing the efficiency of accelerator application.

32324 (CONF-8010206—Vol.2, pp vp) **Calculational parameters of the accelerating-focusing channel of the HF injector for the linear accelerator of the AN USSR IYaI meson factory.** Vasyuchenko, A.V.; Vyalov, G.N.; Esin, S.K.; Ostroumov, P.N.; Pashen'kov, A.S.; Senichev, Yu.V.; Chursin, A.G. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of investigation of RF injector (RFI) for the meson factory linac are presented. Investigated are the conditions providing effective bunching of particles, their capture into the acceleration mode, possibilities of change of the bunch output parameters at the expense of the choice of parameters of the accelerating structure and the analysis of electric fields in the four-wire line with electrodes. The main parameters of the RFI are as follows: average radius of the channel 6.23 mm, electric potential on the electrodes 121.9 kV, modulation coefficient 1.04-1.69, acceleration efficiency 0.0122- 0.428, the number of bunching periods 14, length 1.3 m. The parameters of the beam have been investigated at current pulse of 50 and 100 μA. The beam current equals 44 mA within the range of the required normalized emittance of 0.15π cmxmrad at the RFI output at beam current of 50 μA; at beam current of 100 μA the part of accelerated particles constituted 75 μA.

32325 (CONF-8010206—Vol.2, pp vp) **Neutron energy distributions behind 2m concrete shield on 660 MeV proton beam incidence.** Alejnikov, V.E.; Bamblevskij, V.P.; Komochkov, M.M. (Joint Inst. for Nuclear Research, Dubna (USSR)); Grechko, V.V. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Experimental data on neutron spectra within the energy range of 10^{-8}-660 MeV behind the two-meter concrete shielding during the 660 MeV proton beam incidence are presented. The beam diameter in the place of beam incidence was equal to 16 cm. The number of the protons constituted $(2.60+-0.16)x10^{9}$ s^{-1}. Spectra measuring was conducted in three places of the shielding surface: in the point of intersection of the shielding plane with the continuation of the beam axis (point I) in the point of intersection of the shielding plane with the normal from the centre of beam incidence (point 3) and in the point two located between the points 1 and 3 at the distance of 50 cm from the point 1. The neutron flux densities of the energy above 10^{-8} MeV determined in the points 1, 2 and 3 are equal to $2.4x10^{3}$, $3.3x10^{3}$ and $2.2x10^{3}$ $cm^{-2}xs^{-1}$ respectively. Noted is the presence of the maximum of energy dependence of the neutron fluence about 100 MeV in the "hard" spectra of restored neutrons behind the entire shielding of accelerators. No essential change of the form of the neutron spectrum behind the shielding takes place when a copper target is put in the way of the proton beam. The applied set of detectors and the method of spectra restoration reveal more definitely the part of the spectrum of neutrons of the energy less than 1 MeV.

32326 (CONF-8010206—Vol.2, pp vp) **Present status of construction of the meson factory of the Institute for Nuclear Reserches and future program of investigations.** Lobashev, V.M. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The meson factory linear accelerator is under construction in the Nuclear Researcch Institute i.n Moscow is described. The accelerator would accelerate protons and negative ions of hydrogen up to the energy of 600 MeV and average current of 0.5-1 μA. The construction of the accelerator foundation is finished at present, HF amplification channels for the initial part of the accelerator and 30% of amplification channels for the basic part are constructed. The accelerating tube of the proton injector and its source of 750 kV pulse voltage are developed and tested. A beam of the intensity up to 600 μA is obtained on the proton source. An experimental meson factory facility intended for the application of the beams of protons, π-mesons, μ-mesons, neutrons and neutrino is described. Construction of the accumulator-buncher of protons with recharge injection and suerconducting meson trap with the density of neutrino flux up to $2x10^{8}$ $cm^{-2}xs^{-1}$ is presupposed. Enumerated are the directions of investigations planned at the meson factory such as: study of a wide range of phenomena connected with strong, weak and electromagnetic interactions of elementary particles, study of nuclear structure, measuring of some basic nuclear constants, simulation of radiation damages, production of radioactive isotopes, pion radiotherapy, etc.

32327 (CONF-8010206—Vol.2, pp vp) **Heavy ion fusion program at ARGONNE.** Martin, R.L.; Arnold, R.; Burke, R.; Watson, J. (Argonne National Lab., IL (USA)). 1981. Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

A facility comprising Xe ion source of 60 mA beam current, preaccelerator - the 1.5 MeV dynamitron, the 3.1 MeV RF-accelerator, three sections of the 20 MeV wideroe linear accelerator, 220 MeV stocking ring and the 10 GeV accumulator is developed for executing the program of using heavy ion beam for the purposes of thermonuclear fusion in the Argonne National Laboratory. The heavy ion accelerating facility and the basic results, obtained within the latest two years are described. A preaccelerator and RF-resona-

tors are put into operation. The 50 μA and 1.3 MeV pulse beam of Xe^{+1} ions is obtained in the preaccelerator. The source of Xe ions having 3 cm aperture in diameter and 100 μA beam current is developed. The dynamitron has been completely reconstructed. The beam monitoring system comprising Faraday cups and current toroidal transformer is developed. Beam emittance is equal to 0.019 cmxmrad is measured in the preaccelerator by means of this monitoring system.

32328 (CONF-8010206—Vol.2, pp vp) **Automatized target devices for radioisotope production at the RITs cyclotron.** Bogdanov, P.V.; Ivanov, V.V.; Karasev, B.G. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

An automation target device intended for isotope production on the internal beam of the RITs cyclotron is decribed. The target device comprises the following main units: target head, vacuum lock, charging device, transport system for bringing the target for charging; mechanism of target discharge transport device, control interlocking and signalling control system of target radiation power. The automation target device permits radioisotope production on the cyclotron in commercial scales with automation substitution of irradiated targets. The time of substitution of one of six targets makes up only 5 min. The time of charging a new group of targets to the charge device - 60 min. Contact of the personnel with irradiated targets is practically excluded and the necessity of entering the cyclotron room for maintenance of the plant is reduced to the minimum.

32329 (CONF-8010206—Vol.2, pp vp) **Optimization of the thickness of a hydrogen-containing absorber in heterogeneous side shields of high-energy accelerators.** Belogorlov, E.A.; Britvich, G.I.; Krupnyj, G.I.; Kryuchkov, V.O.; Lebedev, V.N.; Lukanin, V.S.; Mokhov, N.V.; Peleshko, V.N.; Rastsvetalov, Ya.N. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Extended (channels of particle transport, ring tunnels) and local (targets, beam locks, absorbers) radiation sources were simulated for the study and analysis of spatial and spectral distributions of the fluence and equivalent dose of the neutrons behind the shieldings of high-energy accelerators during the interaction of the 70 GeV proton beam with the targets. Spectral characteristics of the neutron component of radiation behind the steel and (or) concrete shielding were calculated. It is noted that the balance between different energy groups of neutrons up to the thickness of 300-400 cm is not established in the steel. Behind the thickness of more than two metres the value of equivalent dose in 90% is determined by slow and intermediate neutrons. The balance between different energy groups of neutrons in the concrete ensures at the depth of 0.8 m. When the balance is attained the equivalent dose is determined by intermediate (15%) fast (25%) and superfast (40%) neutrons. Assemblies of 2U0 cm steel and 22 cm concrete, 200 cm steel and 88 cm concrete were calculated as heterogeneous shielding. The data on spectral and component composition of radiation behind the shieldings of high-power accelerators can also serve as the base for the choice of radiation control means in similar facilities.

32330 (CONF-8010206—Vol.2, pp vp) **Numerical simulation of beam capture for the Phasotron with spatial variation of magnetic field.** Vorozhtsov, S.B.; Dmitrievskij, V.P. 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of numerical simulation of particle beam motion from an ion source up to the moment of stabilization of the acceleration mode for the JINR phasotron with a spatial magnetic field variation are presented. A part of particles confined in the acceleration mode is 9% of the beam intensity passing through a puller. The axial motion losses are 58%, particles into the centre are 33%. The injection duration is found to be 23 μs at the 543 Hz acceleration cycle recurrent frequency. Tolerances for the mean magnetic field deviation from the calculated one are determined (+-10 Gs), as well as the threshold accelerating voltage amplitude (40 kV), at which particles can not bend around the central electrodes in the first cycle is calculated. It is shown that for upper limiting of a spectrum of 3.5 cm radial amplitudes it is necessary that the amplitude of the first harmonic of magnetic field does not exceed 4 Gs in the (4-30) cm resonance region.

32331 (CONF-8010206—Vol.2, pp vp) **KEK status and future.** Tetsuji Nishikawa. 1981. Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Present state of the KEK proton synchrotron of the National Laboratory of High Energy Physics in Japan is described. The state of the KEK photon factory and the "TRISTAN" design (electron-proton colliding beams) are briefly described. Growth of the proton beam intensity in the KEK during the recent 5 years and fluctuations of the beam intensity in the main ring and booster is presented. Investigations conducted on the KEK are enumerated. They comprise acceleration of polarized protons. A new type of the source of polarized ions for obtaining negative ion beam of 3 μA current having 40% polarization is developed for this purpose. The photon factory is being under construction for investigations by means of the synchrotron radiation. Construction of the linear accelerator, storage ring and equipment is successfully conducted. The construction of the photon factory will be finished in 1982. Use of the KEK proton synchrotron and a linear accelerator of the photon factory as injectors of protons and electrons into the TRISTAN ring is presupposed in the TRISTAN design. Design parameters of the TRISTAN with the possibility of obtaining maximum proton energy of 300 GeV and electron energy of 30 GeV in the superconducting ring with 4.5 T magnetic field are presented. Tests of the model of the superconducting 1 m long magnet of 90 mm diameter of the aperture are conducted. The 5.1 T magnetic field is obtained. Construction of the 0.2 GeV positron linear accelerator and positron-electron beams collision is planned in the TRISTAN design.

32332 (CONF-8010206—Vol.2, pp vp) **Colliding linear electron-positron beam facility (present status).** Anashin, V.V.; Bamburov, Yu.G.; Balakhin, V.E. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The principle of the LEPC facility (linear electron-positron collider) intended for colliding beam production in two linear accelerators of the energy of 2x100 and 2x300 GeV and having 2x1 km and 2x3 km length respectively is described. Operation in the mode of energy accumulation in the resonator of the π-structure is a peculiar feature of the accelerating system. Calculation has shown that the resonator of 5 cm wave length and having 1 cm radius of the whole in the diaphraam is the optimal one. Preliminary tests have shown that the rate of acceleration of about 100 MeV/m is possible is such accelerating structure. The expected luminosity per pulse of ring beam cross section turns to be of the order of $1O^{31}$ $cm^{-2}xs^{-1}$ for 100 GeV. Specificities of experiments on the LEPC are discussed. It is shown that the LEPC facility can be used as a usual double energy accelerator generating rather strong averaae current.

32333 (CONF-8010206—Vol.2, pp vp) **Intensity growth of the IHEP accelerator with the booster (present status).** Ado, Yu.M.; Myaeh, E.A.; Naumov, A.A.; Teplyakov, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The final stage of construction of a new injection system (IS) comprising the 1.5 GeV booster and 30 MeV linear accelerator

injector into the booster is carried out for the increase of up to 10^{14} proton intensity per pulse is the IHEP synchrotron. The new IS is briefly described and its performances are presented. The magnetic system with separate functions of bending and focusing of the beam is presupposed in the booster. The ring electromagnet comprises 12 triplets of quadrupole lenses and 24 dipole bending magnets. The booster vacuum chamber is of stainless steel of 0.25 mm wall thick, the chamber sections are crimped one. The accelerating system comprises 9 tunable RF resonators loaded by ferrite. The RF accelerating system comprises 40 RF stations intended for 600 kW power transmission to the beam. The proton beam transport through the critical energy would be performed by excitation of the magnetic field gradient in the focusing radial electromagnets.

32334 (CONF-8010206—Vol.2, pp vp) **Cyclotron wideband RF system with automatic tuning of working frequency.** Glazov, A.A.; Kochkin, V.A.; Semenov, M.M. 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

A high-frequency system of the J-120 M cyclotron with automatic computerized resonator tunning for an operating frequency is described. The cyclotron resonator is a quater-wave line with plane electrodes the central rod of which transforms into a dee at an open end. Near the dee edge fixed parts of multiplate capacitors are located on side walls of the central dee, while movable parts are electrically and mechanically connected with side walls of the external electrode of the line. Movable panels form a part of the external electrode of a resonance line. When a gap between them and the central rod changes, the characteristic impedance of a part of the resonance line adjoining the short-circuited section also changes, as well as the resonator eigenfrequency. For each of fixed panel positions there are constant programs. To provide precise tuning after program elaboration and to sustain the resonator and generator frequency in the operation mode AFC systems with a phase detector of influencing either the main or trimming capacitors are used. When the energy changes smoothly and slowly, the resonance system, as well as the generator are smooothly retuned without breaking the particle acceleration conditions.

32335 (CONF-8010206—Vol.2, pp vp) **Study on the conditions of proton beam shaping in the ion source of the AN USSR IYaI meson factory.** Esin, S.K.; Yakushev, V.P.; Frolov, O.T.; Polulyakh, V.P. (AN SSSR, Moscow. Inst. Yadernykh Issledoanij); Gerasimov, E.I.; Tarvid, G.V. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of measuring proton beam emittance in duoplasmatron ion source with tungsten-barium direct-heated cathode intended for 750 keV injector of the linear accelerator are presented. The system of ion extraction comprises an expander and extraction grid. Peculiarities of primary beam formation at different configurations of the expander: a) expander in the form of a cylinder, b) conical expander, c) the same conical expander but with a splitter installed behind the anode window and permitting to cut off the central part of plasma flux; "sectional" expander made of 5 separated from one another similar metal rings of 16 mm height fixed in the cylinder made of insulator, are studied. The diameter of the duoplasmatron window equals 0.8 mm. It is shown that beam formation with the help of cylindrical and conical with a splitter expanders meet the requirements of the proton injector and well satisfy the aperture of the channel of the accelerating tube of 54 mm diameter.

32336 (CONF-8010206—Vol.2, pp vp) **Superconducting quantum interference monitor of charged particle beam current.** Gertsev, K.F.; Mikheev, M.S. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Description and test results of the monitor of charged particle beam current on the base of the high-frequency superconducting quantum interference detector with lead slotted shield are presented. The toroidal superconducting coil, which covers the measured beam has 16 turns wound by the lead belt of 7 mm width with 0.5 mm gaps between the turns. A superconducting low-coupling monitor having two holes and point oxidated niobium contact has been used in the mode of quanta counting of magnetic flux. The lead point shield was 2 mm thick and it had 30 mm aperture. The coefficient of background shielding within 0-200 Hz frequency range constituted more than 10^9. The threshold current resolution of the monitor had the value less than 01 $\mu A \sqrt{Hz}$. The suggested monitor requires helium cooling. The proposed design of the monitor is applicable for mounting on the vacuum chamber when it is surrounded by helium conductor. In other cases mounting of low-powerful autonomic system or cryostat of helium storage up to several weeks is possible.

32337 (FERMILAB/TM—1166) **Response of the Saver Dipole Beam Tube to single-phase helium pressure.** Biallas, G.; Barner, D. (Fermi National Accelerator Lab., Batavia, IL (USA)). 19 Jan 1983. Contract AC02-76CH03000. 25p. NTIS, PC A02/MF A01. Order Number DE83012015.

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One Energy Saver Dipole Beam Tube (No. MB 124211) was tested under static and pulsed pressure conditions. Under static pressure, permanent deformation started at about 125 psi and reached .006 inches across flats after 220 psi exposure. Final catastrophic collapse occurred at 325 psi. Pressure pulses of shape and duration approximating the single phase helium pressure during a full house quench had no effect on the tube (previously staticly pressurized to 220 psi) up to 285 psi and a slight yield effect at 305 psi. Repeated pulses at 305 psi appeared to cause little or no further yielding. When compared to static pressure effects the 305 psi pulse produced the same deflection as about 235 psi static pressure.

32338 (FERMILAB/TM—1182) **Magnetic field properties of Fermilab Energy-Saver dipoles.** Hanft, R.; Brown, B.C.; Cooper, W.E.; Gross, D.A.; Michelotti, L.; Schmidt, E.E.; Turkot, F. (Fermi National Accelerator Lab., Batavia, IL (USA)). Mar 1983. Contract AC02-76CH03000. 4p. NTIS, PC A02/MF A01. Order Number DE83012009.

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At Fermilab we have operated a production line for the fabrication of 901 21 foot long superconducting dipoles for use in the Energy Saver/Doubler. At any one time 772 of these dipoles are installed in the accelerator and 62 in beamlines; the remainder are spares. Magnetic field data are now available for most of these dipoles; in this paper we present some of these data which show that we have been able to maintain the necessary consistency in field quality throughout the production process. Specifically we report harmonic field coefficients, showing that the mechanical design permits substantial reduction of the magnitudes of the normal and skew quadrupole harmonic coefficients; field shape profiles; integral field data; and field angle data.

32339 (FERMILAB/TM—1184) **Magnetic field data on Fermilab Energy-Saver quadrupoles.** Schmidt, E.E.; Brown, B.C.; Cooper, W.E.; Fisk, H.E.; Gross, D.A.; Hanft, R.; Ohnuma, S.; Turkot, F.T. (Fermi National Accelerator Lab., Batavia, IL (USA)). Mar 1983. Contract AC02-76CH03000. 4p. NTIS, PC A02/MF A01. Order Number DE83012017.

The Fermilab Energy Saver/Doubler (Tevatron) accelerator contains 216 superconducting quadrupole magnets. Before installation in the Tevatron ring, these magnets plus an additional number of spares were extensively tested at the Fermilab Magnet Test Facility (MTF). Details on the results of the tests are presented here.

32340 (FERMILAB/TM—1186) **Long-term stability of Fermilab Energy-Saver magnets.** Cooper, W.E.; Brown, B.C.; Hanft, R.W.; Schmidt, E.E. (Fermi National Accelerator Lab., Batavia, IL (USA)). Mar 1983. Contract AC02-76CH03000. 4p. NTIS, PC A02/MF A01. Order Number DE83012014.

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The quench and field properties of Energy Saver dipole and quadrupole magnets are measured at the Fermilab Magnet Test Facility shortly after the magnets have been produced. It is important that magnet properties remain unchanged with time. This question has been investigated by remeasuring magnets at a later time and comparing the two sets of measurements. The remeasurements agree well with the original measurements. The measurement techniques and magnet properties obtained from the full magnet samples are described elsewhere.

32341 **(FERMILAB/TM—1187) RF device for precision location of the beam-position detectors in the Energy Saver.** Kerns, Q.A.; Biallas, G.H.; Turkot, F.; Webber, R.C.; Wehmann, A. (Fermi National Accelerator Lab., Batavia, IL (USA)). Mar 1983. Contract AC02-76CH03000. 4p. NTIS, PC A02/MF A01. Order Number DE83012013.

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The task is to measure the center line of the beam detector with respect to the magnetic centerline with a precision of +-0.2 mm; the measurement must be made on 250 magnets (they come in 6 lengths, from 25" to 99") by a technician. Optical, mechanical, and electrical techniques for carrying out this procedure were considered. An RF device operating at 53 MHZ was adopted for the following reasons: (a) it provides complete electrical checkout of the hardware at operating frequency, including the bidirectional operation of the pickup, (b) no mechanical contact with the strip lines is required, and (c) the demands of production measurements and maintenance of calibration are better matched to the skills of an average technician. We describe the conceptual design, fabrication, and performance of this device.

32342 **(FERMILAB/TM—1190) Wide-band neutrino beams at 1000 GeV.** Malensek, A.; Stutte, L. (Fermi National Accelerator Lab., Batavia, IL (USA)). 11 Apr 1983. Contract AC02-76CH03000. 13p. NTIS, PC A02/MF A01. Order Number DE83012019.

In a previous publication, S. Mori discussed various broadband neutrino and antineutrino beams using 1000 GeV protons on target. A new beam (SST) has been designed which provides the same neutrino flux as the quadrupole triplet (QT) while suppressing the wrong sign flux by a factor of 18. It also provides more than twice as much high energy antineutrino flux than the sign-selected bare target (SSBT) and in addition, has better neutrino suppression. While it is possible to increase the flux obtained from the single horn system over that previously described, the conclusion which states any horn focussing system seems to be of marginal use for Tevatron neutrino physics, is unchanged. Neutrino and antineutrino event rates and wrong sign backgrounds were computed using NUADA for a 100 metric ton detector of radius 1.5 meters. Due to radiation considerations and the existing transformer location, the horn beam is placed in its usual position inside the Target Tube. All other beams are placed in Fronthall. Thus, for the wide-band Fronthall trains a decay distance of 520 meters is used, versus 400 meters for the horn train. (WHK)

32343 **(INS-TH—137) Beam spill control with frequency modulation in electron synchrotron.** Fukushima, T.; Noguchi, S.; Yoshioka, M.; Arai, S.; Yoshida, K. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jul 1981. 11p. (In Japanese). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700834.

The new method has been applied to the beam spill control of the INS electron synchrotron. In this method, the RF operating frequency is slowly increased at the final stage of the accelerating period. Then the equilibrium orbit shrinks and the beam hits the radiator gradually, staying in the stable phase. The new method gives the uniform beam spill in the energy region below 700 MeV where the old method has not been successful enough.

32344 **(INS-TH—139) QUAD TAG MODULE.** Shiino, K.; Maruyama, K. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Aug 1981. 15p. (In Japanese). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700835.

Electronic circuits called QUAD TAG MODULE were developed and constructed, which were of exclusive use for signals from scintillation counter hodoscope of the photon tagging system. The circuit has functions of amplifiers, discriminators, and strobed coincidences in one NIM module. A description on functions and specifications of the module is given.

32345 **(JINR—9-81-684) System for suppression of magnetic field low frequency pulsations of the Dubna synchrophasotron.** Glushchenko, V.G.; Kurskov, I.A.; Smirnov, A.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy). 1982. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700364.

A system for suppression of magnetic field low frequency pulsations of the Dubna synchrophasotron is described. It is performed by means of the compensation coils laid near the main coil. The compensation coils are supplied from the amplifier strength transistor and are switched on the amplifier arm so that coil constant ampereturns are subtracted, and variables being put together, are directed in antiphase against ampere turns of the synchrophasotron main coil. In series with the compensation coils resistors are switched on. Tne transistor amplifier is monitored by coupling coils laid near the compensation coils via correcting chains. Its operation stability is provided by feedback over voltage and current. This solution quaranteed a reliable operation of the system and suppression of low frequency pulsations, for example, of 50 Hz, not less than by 15 times.

32346 **(JINR—9-81-703) Study on the plasma diode in the external magnetic field.** Korenev, S.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods). 1981. 4p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700365.

The experimental investigations of plasma diode with cathode plasma formation on the basis of an incomplete charge over dielectric surface in the external longitudinal magnetic field with the intensity of Hsub(z) up to 2000 Oe are presented. It is demonstrated that at the 150-250 keV diode voltage and the current density of up to 300 A/cm^2 the homogeneity of the current density over transverse cross section is preserved up to the cell size of metallic grid onto cathode with the change of the magnetic field up to 2000 Oe.

32347 **(JINR—9-81-736) Test facility for ion source investigation.** Glazov, A.A.; Zhigalkin, N.K.; Shakun, N.G. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems). 1981. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700366.

A test facility designed and built for the investigation of ion sources, ion axial injection system and elements of electrostatic beam extraction system for the cyclotron type accelerators is described. The facility basic units and systems designed on the base of an electromagnet with the 50 cm pole diameter are described. The magnet field induction inside 120 mm high the working gap is 1.2 T. The vacuum chamber matches to a central region of the JINR phasotron. It is maintained by means of an oil-diffusion pump or by a magnetodischarge diode ion pump. The gas supply system includes á hydrogen separating device with a palladium filter. All other gas contaminations in pure hydrogen are less than $1x10^{-7}$ percent. The power supply, control and data acquisition systems are also described.

32348 **(JINR—13-81-847) Synchronizer of cyclotron ion source and H.F. generator modulator.** Kuznetsov, A.N. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions). 1982. 5p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700363.

A unified synchronizer for the U-200, U-300, U-400 heavy ion accelerators is described and its principal diagrams are presented. The unit fulfils amplitude and time shaping of strobe signals for a modulator of H.F. generator and for cyclotron heavy ion source, and provides for the delay between the signals. Timing of accelerating pulse is possible from an external source, an internal generator with variable frequency or from a supply system. In the latter case the decrease in output signal instability is achieved by their phasing with supply voltage pulsation.

32349 (JINR-R—9-82-70) SILUND-20 accelerator electron source investigation. Dolbilov, G.V.; Kowalski, M.; Lebedev, N.I.; Petrov, V.A.; Petrov, V.A.; Fateev, A.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods). 1982. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700368.

The cold cathode electron source has been investigated to get information on its work mechanism, to find the device development outlooks and to describe its applicability to the SILUND-20 accelerator. Its beam has been investigated with many-collector probe. The MERA-60 computer controlled the measurements and processed the results. Current density distribution figure was represented in a matrix form. The electron pulsed beam of about 1 kA with 50 Hz frequency has been obtained from the source. Its current instability is not greater than 1%. Tungsten cathode has been working about 500 hours with current of 500 to 1000 A with no current stability violation. At optimal magnetic field amplitude B=0.1 T, diameter of the beam d=8+-3 mm. Emittance E=100+-30 mradxcm. The beam with current of some kiloamperes may be obtained when pressure in discharge tube accelerating tension are greater.

32350 (KFK—3362) Neutrino physics at the pulsed Spallation Neutron Source SNS. Maschuw, R.; Zeitnitz, B. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik). Jun 1982. 58p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750010.

An experimental facility for neutrino physics at the Spallation Neutron Source SNS at the Rutherford Appleton Laboratories in Chilton, England, is described. Neutrinos νsub(μ), νsub(e) and anti νsub(μ) will be produced by the SNS with energies of 0-53 MeV for anti νsub(μ) and νsub(e) and 30 MeV for νsub(μ). Time and energy structure of the different neutrino spectra allow the observation of various neutrino induced reactions simultaneously with a suitable detector system. Thorough investigations on the background-accelerator associated as well as from cosmic rays - led to the requirement of a separated neutrino cave 22 m below the SNS target to perform such experiments. A multipurpose detector is proposed consisting of a 50 ton segmented organic scintillator detector and another 50 ton wide gap liquid argon detector. For this system feasibility studies are presented for experiments on elastic neutrino electron scattering, inelastic scattering of neutrinos from carbon nuclei and inverse β-decay processes on carbon and hydrogen nuclei. Experimental sensitivities are investigated in detail for neutrino oscillation experiments and purely leptonic weak interaction processes i.e. electron neutrino scattering. The proposed experiments will be feasible with good statistics and small systematic errors.

32351 (LA-UR—83-1137) Remote handling and accelerators. Wilson, M.T. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 5p. (CONF-830311—112). NTIS, PC A02/MF A01. Order Number DE83011161.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

The high-current levels of contemporary and proposed accelerator facilities induce radiation levels into components, requiring consideration be given to maintenance techniques that reduce personnel exposure. Typical components involved include beamstops, targets, collimators, windows, and instrumentation that intercepts the direct beam. Also included are beam extraction, injection, splitting, and kicking regions, as well as purposeful spill areas where beam tails are trimmed and neutral particles are deposited. Scattered beam and secondary particles activate components all along a beamline such as vacuum pipes, magnets, and shielding. Maintenance techniques vary from hands-on to TV-viewed operation using state-of-the-art servomanipulators. Bottom- or side-entry casks are used with thimble-type target and diagnostic assemblies. Long-handled tools are operated from behind shadow shields. Swinging shield doors, unstacking block, and horizontally rolling shield roofs are all used to provide access. Common to all techniques is the need to make operations simple and to provide a means of seeing and reaching the area.

32352 (UCRL—88265) Advanced Test Accelerator (ATA) injector. Jackson, C.H.; Bubp, D.G.; Fessenden, T.J.; Hester, R.E.; Neil, V.K.; Paul, A.C.; Prono, D.S. (Lawrence Livermore National Lab., CA (USA)). 9 Mar 1983. Contract W-7405-ENG-48. 5p. (CONF-830311—111). NTIS, PC A02/MF A01. Order Number DE83011274.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

The ATA injector, developed from experience gained from the Experimental Test Accelerator (ETA) linac, has recently been completed. The injector consists of ten 0.25 MV cells that are used to develop 2.5 MV across a single diode gap. The 10 kA beam is extracted from a 500 cm^2 plasma cathode at average rates of up to 5 Hz and burst rates to 1 kHz. Pulsed power from 20 water filled blumleins is divided and introduced symmetrically through four ports on each cell. All major insulators are fabricated from filled epoxy castings. With these improvements, the ATA injector is smaller than the ETA injector; has a faster pulse response; has lower voltage stress on insulators and higher ultimate performance. Injector characterization tests began in October 1982. These tests include beam current, energy, and emittance measurements.

32353 Negative ion source with hollow cathode discharge plasma. Hershcovitch, A.; Prelec, K. (to Dept. of Energy). US Patent 4,377,773. 22 Mar 1983. Filed date 12 Dec 1980. vp.

PAT-APPL-215770.

A negative ion source of the type where negative ions are formed by bombarding a low-work-function surface with positive ions and neutral particles from a plasma, wherein a highly ionized plasma is injected into an anode space containing the low-work-function surface. The plasma is formed by hollow cathode discharge and injected into the anode space along the magnetic field lines. Preferably, the negative ion source is of the magnetron type.

4304 Storage Rings

REFER ALSO TO CITATION(S) 32309

32354 (INS-TH—133) Study on superconducting accelerating cavities. Noguchi, S.; Fukushima, T.; Yoshida, K.; Yoshioka, M. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Mar 1981. 21p. (In Japanese). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700831.

A test cavity of cylindrical shape has been designed and constructed to study superconducting accelerating cavities for TRISTAN e^+e^- Ring. Higher order modes have been calculated by using SUPERFISH program and an analytical method, and measured. The measured resonant frequencies well agree with the calculated results.

32355 (INS-TH—134) Study on superconducting accelerating cavities, 2. Noguchi, S.; Fukushima, T.; Yoshida, K.; Yoshioka, M. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). 12 May 1981. 12p. (In Japanese). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700832.

Several kinds of input couplers for the superconducting accelerating cavities of 500 MHz have been tested at the room temperature. The coaxial probe and coaxial magnetic probe (loop) coupling system with a stub called field transformer could give the external Q value of about 10^4, which is low enough for TRISTAN e^+e^- ring.

44 INSTRUMENTATION

4401 Radiation Instrumentation

REFER ALSO TO CITATION(S) 31079, 31131, 31133, 31134, 31304, 31312.

31334, 32141, 32193, 32312, 32315, 32316, 32317, 32318, 32761

32356 (ANL-HEP-CP—83-10) Muons and electrons in general. Nodulman, L.; Bensinger, J. (Argonne National Lab., IL (USA); Brandeis Univ., Waltham, MA (USA)). 1983. Contract W-31-109-ENG-38. 2p. (CONF-830224—3). NTIS, PC A02/MF A01. Order Number DE83010749.

From DPF workshop on collider detectors: present capabilities and future possibilities; Berkeley, CA, USA (28 Feb 1983).

We address the problem of simultaneously identifying electrons and muons in a general-purpose detector at a luminosity of 10^{33} $cm^{-2}sec^{-1}$. Those discoveries and important measurements which are reasonably well predicted now are under way and likely to be fairly complete before turn on. The signatures of new effects to be found at high rates are not well predicted, and for flexibility it may be necessary to look simultaneously for some combination of jets, missing E/sub T/, electrons, and muons. This leads immediately to an open geometry with magnetic tracking and calorimetry. At high luminosity, getting out trigger informtion quickly is a prime concern. Note that if a given signature requires isolating individual events then even for an optimistic integration time of 20 ns, the optimal luminosity is about $2x10^{32}cm^{-2}sec^{-1}$. We have not had the opportunity to be very specific in design or to consider the extended momentum range implied by 10 to 20 TeV collisions.

32357 (BNL—32581) MPS II drift-chamber system. Eiseman, S.; Etkin, A.; Foley, K.J. (Brookhaven National Lab., Upton, NY (USA); City Coll., New York (USA)). 1983. Contract AC02-76CH00016. 15p. (CONF-830223—4). NTIS, PC A02/MF A01. Order Number DE83010854.

From Wire chamber conference; Vienna, Austria (15 Feb 1983).

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A description is given of a drift-chamber system that has very good resolution and beam rate capabilities in a compact and reasonably priced package.

32358 (BNL—32719) Design and expected performance of a fast scintillator hadron calorimeter. Palmer, R.B.; Ghosh, A.K. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 4p. (CONF-830224—4). NTIS, PC A02/MF A01. Order Number DE83010851.

From DPF workshop on collider detectors: present capabilities and future possibilities; Berkeley, CA, USA (28 Feb 1983).

A typical pulse from the 807 calorimeter is shown. This was generated by 4 GeV electrons but the pulses from hadrons and at different energies are not significantly different. The width and shape of this pulse comes from the convolution of a number of sources: (a) The time spread of energy deposition by a shower including time of flight of slow protons and neutrons, (b) scintillator phosphor rise and decay times, (c) shifter rise and decay times, (d) phototube response, (e) time delays in the light collection from different parts of the calorimeter and time dispersion in transmission. The objective of the first phase of this study was to isolate these spearate contributions, estimate how they could be speeded up and find what costs are involved. In the second phase we constructed an extremely crude calorimeter whose pulses should have the same characteristic as in a real device. With this we have observed signals whose mean width was 7 nsec and whose width at 10% of maximum height was 15 nsec. Clipping could reduce these widths to 6 and 12 nsec respectively. We conclude that gate times of less than 20 nsec would be appropriate for such a calorimeter.

32359 (CONF-821074—4) Spatial resolution of neutron-position scintillation detectors. Strauss, M.G.; Brenner, R.; Chou, H.P.; Schultz, A.J.; Roche, C.T. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83010777.

From Workshop on position-sensitive detection of thermal neutrons; Grenoble, France (11 Oct 1982).

An Intense Pulsed Neutron Source (IPNS) was recently built at Argonne. From the point of view of neutron detection a pulsed source has two characteristics which are basically different from those of a steady-state source such as a reactor: broad spectrum of neutron energies in which a greater fraction of the flux is in the epithermal range, and high instantaneous neutron flux. A detector to be used with a pulsed source should therefore have: high neutron detection efficiency extending to epithermal energies, and high instantaneous count-rate capability. In response to these requirements a new neutron position-sensitive detector was developed. The detector is comprised of an array of photomultiplier tubes coupled to a thin ^{6}Li-glass scintillator. The principle of operation is similar to that of the Anger gamma-ray camera used in nuclear medicine.

32360 (EUR—6534-EN) Thermoelectric neutron dosimetry: summary of recent results. Mathieu, F.; Meier, R.; Debrue, J.; Leonard, F.; Nihoul, J. (Commission of the European Communities, Luxembourg). [nd]. 18p. NTIS, PC E03/MF E03.

The basic principles of thermoelectric dosimetry, supported by early experimental results of Pt-10% Rh/Pt and Chromel/Alumel sensors are described. Actual results of sensor irradiations up to thermal and fission fluences exceeding 10 to the 22 power nvt are reported. Because of its attractive features it is claimed that thermoelectric dosimetry presents a competitive method for characterizing irradiation-induced material degradation.

32361 (FERMILAB/TM—1178) Gas-mixing system for drift chambers using solenoid valves. Cooper, W.E.; Sugano, K.; Trentlage, D.B. (Fermi National Accelerator Lab., Batavia, IL (USA)). Apr 1983. Contract AC02-76CH03000. 8p. NTIS, PC A02/MF A01. Order Number DE83012012.

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We describe an inexpensive system for mixing argon and ethane drift chamber gas which is used for the E-605 experiment at Fermilab. This system is based on the idea of intermittent mixing of gases with fixed mixing flow rates. A dual-action pressure switch senses the pressure in a mixed gas reservoir tank and operates solenoid valves to control mixing action and regulate reservoir pressure. This system has the advantages that simple controls accurately regulate the mixing ratio and that the mixing ratio is nearly flow rate independent. We also report the results of the gas analysis of various samplings, and the reliability of the system in long-term running.

32362 (INS-TH—135) High voltage pulsing system for wire spark chambers. Kono, K.; Miyachi, T. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). 12 May 1981. 18p. (In Japanese). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700833.

High voltage pulsing system for wire spark chamber has been constructed for the high energy physics experiment at INS 1.3 GeV electron synchrotron. This system consists of a high voltage power supply, a Thyratron pulse generator and a Krytron trigger circuit. In this paper, characteristic features, circuit diagrams and test results of this system are described.

32363 (Juel-Spez—141) UNIDAS manual. Eckold, G.; Mitlacher, H. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.)). Feb 1982. 141p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750256.

The triple axis spectrometer UNIDAS is an instrument for investigations of the dynamics of condensed matter. It has especially been designed to be used by external users from all of the universities in Germany. The main purpose of the present handbook is to give informations about the triple axis spectrometer UNIDAS, about lay-out, properties and possible experiments. Furthermore a short survey of the fundamentals of neutron scattering as well as of the method of triple axis spectrometry is given. The basic ideas of neutron scattering (correlation function, scattering function etc.) are introduced. Discussing some particular examples it is shown how to calculate scattering functions theoretically and how to interpret experimental spectra. The triple axis method is compared with other neutron scattering techniques. Construction and operation of UNIDAS are presented. The effect of the resolution function of the spectrometer is discussed. Peripheral devices for the sample environment which can be used with UNIDAS are described. Finally, the most important data are summarized in the appendix.

32364 **(LBL—91-Suppl.) Major detectors in elementary-particle physics.** Gidal, G.; Armstrong, B.; Rittenberg, A. (Lawrence Berkeley Lab., CA (USA)). Mar 1983. Contract AC03-76SF00098. 84p. NTIS, PC A05/MF A01. Order Number DE83011015.

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With the 1983 issue of LBL-91 we introduce a supplement - a folio of descriptions of the world's major elementary particle physics detectors. Modern high energy physics usually involves the use of massive, costly, carefully engineered, large solid angle detectors. These detectors require a long lead time for construction, are often integrated with an accelerator, accumulate data over many years, and are in reality a combination of numerous subsystems. As was the case with bubble chambers, many experiments are performed with the same data, or with data taken after relatively minor changes or additions to the detector configuration. These experiments are often reported in journals whose space limitations make repeated full descriptions of the detector impossible. The detailed properties and performance of the detector are usually described in a fragmented series of papers in more specialized, technologically oriented journals. New additions are often not well documented. Several detectors often make similar measurements and physicists want to make quick comparisons of their respective capabilities. Designers of new large detectors and even of smaller experiments need to know what already exists and what performance has been achieved. To aid the physics community, the Particle Data Group has produced this brief folio of the world's major large detectors. This first edition has some notable omissions: in particular, the bubble chambers and any associated spectrometers, and the still somewhat tentative LEP, SLC, and TRISTAN detectors.

32365 **(MINTEK-M—52) High-speed, multi-input serial-interfacing system for a computer with simultaneous back-up recording on magnetic tape. Report No. M52.** Andeweg, A.H. (Council for Mineral Technology, Randburg (South Africa)). 21 Mar 1983. 46p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901912.

A system has been developed that interfaces nuclear-instrument data modules and a multichannel analyzer into a computer. The interface converts 4-bit binary-coded decimal (BCD) data into 8-bit packed BCD data, and converts the parallel data into serial data. The data are transmitted up to a distance of 500 m at a transfer rate of 153,6 kbaud via an RS422 transmission link to a central computer system. One or more multichannel analyzer systems can be connected to the system via a routing device. The routing device serves these analyzers on a first-come-first-served mode. The data transmitted to the computer system are recorded simultaneously on a digital magnetic-tape drive to provide a back-up facility.

32366 **(PNL—4481) Hanford beta-gamma personnel dosimeter prototypes and evaluation.** Fix, J.J.; Holbrook, K.L.; Soldat, K.L. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 69p. NTIS, PC A04/MF A01. Order Number DE83012058.

Upgraded and modified Hanford dosimeter prototypes were evaluated for possible use at Hanford as a primary beta-gamma dosimeter. All prototypes were compatible with the current dosimeter card and holder design, as well as processing with the automated Hanford readers. Shallow- and deep-dose response was determined for selected prototypes using several beta sources, K-fluorescent x rays and filtered x-ray techniques. All prototypes included a neutron sensitive chip. A progressive evaluation of the performance of each of the upgrades to the current dosimeter is described. In general, the performance of the current dosimeter can be upgraded using individual chip sensitivity factors to improve precision and an improved algorithm to minimize bias. The performance of this dosimeter would be adequate to pass all categories of the ANSI N13.11 performance criteria for dosimeter procesors, provided calibration techniques compatible with irradiations adopted in the standard were conducted. The existing neutron capability of the dosimeter could be retained. Better dosimeter performance to beta-gamma radiation can be achieved by modifying the Hanford dosimeter so that four of the five chip positions are dévoted to calculating these doses instead of the currently used two chip positions. A neutron sensitive chip was used in the 5th chip position, but all modified dosimeter prototypes would be incapable of discriminating between thermal and epithermal neutrons. An improved low energy beta response can be achieved for the current dosimeter and all prototypes considered by eliminating the security credential. Further improvement can be obtained by incorporating the 15-mil thick TLD-700 chips.

32367 **(UCRL—53386) Intrinsic Radiation Intercomparison Workshop. Summary report by the Weapon and Environment Sub-Group of the Intrinsic Radiation Working Group.** Holt, J.; Holton, R.; Nelson, R.; Riel, G.; Robinson, R. (Lawrence Livermore National Lab., CA (USA)). 25 Jan 1983. Contract W-7405-ENG-48. 26p. NTIS, PC A03/MF A01. Order Number DE83011088.

The Intrinsic Radiation Intercomparison Workshop assessed the variability of radiation measurements made of the same source using different instruments and different operating procedures. Four groups of gamma sources were studied. The gamma-measuring systems were RO-2, Victoreen 208, Eberline E112B, AN/PDR-27, and a gamma spectrometer system; the neutron instruments included the Rascal, Snoopy, PNR-4, and AN/PDR-70. The results indicated that interagency measurement agreement was sufficient for health physics assessment purposes for gamma sources having energies above about 100 keV and for all neutron sources and that careful calibration is absolutely necessary to support field use of the hardware. The workshop participants recommended that the causes of measurement variability be identified wherever possible and, where not, that work be undertaken to clarify the causes of variability.

32368 **Science underground (Los Alamos, 1982).** Nieto, M.M.; Haxton, W.C.; Hoffman, C.M.; Kolb, E.W.; Sandberg, V.D.; Toevs, J.W. (eds.). New York, NY; American Institute of Physics (1983). 466p. (CONF-820989—). American Institute of Physics, New York, NY.

From Workshop on science underground; Los Alamos, NM, USA (27 Sep 1982).

Topics covered include solar neutrinos, proton decay, cosmic rays, geophysics, gravity waves, double beta decay, and possible future research directions with underground detectors. Abstracts of individual items from the conference were prepared separately for the data base. (GHT)

32369 **$4\pi\beta$-γ coincidence system with minimally broadened pulses.** Gehrke, R.J.; Johnson, L.O. (Idaho National Engineering Lab., Idaho Falls (USA)). *Nuclear Instruments and Methods in Physics Research;* **204**: No. 1, 191-201(15 Dec 1982).

The performance characteristics of a new type 4π β-γ coincidence system have been measured. In contrast with the conventional 4π β-γ circuitry, which is based on a fixed pulse width (approx.= 2 μs) and a non-extendable dead time, the pulse processing circuitry in this new system is based on a minimally broadened pulse (i.e., as narrow as 0.25 μs). In this system each pulse has a different pulse width, so that the dead times for the β- and γ-ray detectors are determined by summing the measured dead time attributed by each pulse in each channel. The β-γ coincidences are defined with an overlap coincidence circuit. This system is shown to be much less sensitive to mismatch in the coincidence timing than is the conventional system. In spite of the narrower pulse widths, no spurious β pulses are observed when the 4π proportional counter is operated near the center of its plateau. Disintegration rates were measured for calibrated sources with strength up to approx.= 10^6 Bq. These data indicate that with this new system the disintegration rates of very intense sources (approx.= 10^6 Bq) and moderately intense sources (< 10^5 Bq) can be determined with accuracies of approx.= 4% and <= 0.1%, respectively.

32370 **Superficial density measurements by electron absorption on air-pollution samples.** Denecke, B. (Commission of the European Communities, Geel (Belgium). Central Bureau for Nuclear Measurements). pp 474-475 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/79P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32371 **Development of a novel moisture and density gauge by utilizing simultaneous transmission of Cf-252 neutrons and gammas.** Tominaga, H.; Wada, N.; Tachikawa, N. (Radioisotope Center, Japan Atomic Energy Research Inst., Oarai, Ibaraki); Kuramochi, Y.; Horiuchi, S.; Sase, Y. (Hitachi Ltd., Katsuta, Ibaraki (Japan). Naka Works); Amano, H.; Okubo, N.; Nishikawa, H. (Kimitsu Works, Nippon Steel Corp., Chiba, Japan). pp 476-477 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/88P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32372 **Decantation study of fine sediments in the wells of a suction dredge, by means of sounding by gamma diffusion.** Musa, C.; Meyer, G. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Office des Rayonnements Ionisants). pp 479 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/95P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32373 **Radiometric measurements of linear mass, resin content and density of composites.** Boutaine, J.L.; Pintena, J.; Tanguy, J.C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Office des Rayonnements Ionisants). pp 480 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (In French)(IAEA-CN—40/96P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32374 **Gamma level controller for industrial containers.** Vallera, A.M.; Manteigas, J. (Physics Dept., Laboratorio Nacional de Engenharia e Tecnologia Industrial, Sacavem, Portugal); Veiga, C.; Galhardo, A. (Electronics Dept., Laboratorio Nacional de Engenharia e Tecnologia Industrial, Sacavem, Portugal). pp 490 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/65P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32375 **Highly sensitive on-line detection of SO_2, NOsub(x), NH_3, $Ni(CO)_4$ and halocarbons by means of an aerosol ionization detector (AIG).** Grosse, H.J.; Leonhardt, J.; Doering, H.R.; Gleisberg, F. (Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung). pp 490-491 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/90P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32376 **Development, production and application of radioisotope gauges in Polish industry.** Gasiorowski, L.; Urbanski, P. (Institute of Nuclear Research, Warsaw (Poland)). pp 540 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/61P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32377 **Application of nuclear techniques in Turkish industry.** Bilge, A.N. (Cekmece Nuclear Research and Training Center, Istanbul (Turkey)). pp 541 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/71P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32378 **Multianode cylindrical proportional counter for high count rates.** Hanson, J.A.; Kopp, M.K. (to Dept. of Energy). US Patent 4,289,967. 15 Sep 1981. Filed date 23 May 1980. vp.

PAT-APPL-152954.

A cylindrical, multiple-anode proportional counter is provided for counting of low-energy photons (<60 kev) at count rates of greater than 105 counts/sec. A gas-filled proportional counter cylinder forming an outer cathode is provided with a central coaxially disposed inner cathode and a plurality of anode wires disposed in a cylindrical array in coaxial alignment with and between the inner and outer cathodes to form a virtual cylindrical anode coaxial with the inner and outer cathodes. The virtual cylindrical anode configuration improves the electron drift velocity by providing a more uniform field strength throughout the counter gas volume, thus decreasing the electron collection time following the detection of an ionizing event. This avoids pulse pile-up and coincidence losses at these high count rates. Conventional rc position encoding detection circuitry may be employed to extract the spatial information from the counter anodes.

4403 Miscellaneous Instruments

REFER ALSO TO CITATION(S) 31022, 31024, 31025, 31077, 31126, 31127, 31128, 31130, 31136, 31137, 31139, 31330, 31571, 31625, 32011, 32138, 32150

32379 (ANL—82-62, pp 415-421) **Menisci level sensing and surface tension measurement using a laser beam optical lever effect.** Longrigg, P. (Solar Energy Research Inst., Golden, CO). Sep 1982. NTIS, PC A99/MF A01.

In Instrumentation and control for fossil energy processes.

This paper describes the use of a laser beam optical level effect to calibrate scientific volumetric glassware, thereby eliminating the use of mercury for this purpose. The paper also discusses the use of the optical level effect to make non-contact surface tension measurements of liquids.

32380 (CONF-830454—1) **Automatic control of a high-voltage impulse generator by a microcomputer.** Fatheddin, A.; Lakdawala, V.K.; Pai, R.Y.; Christophorou, L.G. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 9p. NTIS, PC A02/MF A01. Order Number DE83012096.

From Southeastcon '83 IEEE Region 3 conference; Orlando, FL, USA (10 Apr 1983).

This paper describes a microcomputer-based control system which operates a high-voltage impulse generator and then processes experimental data collected by laboratory instruments. The statistical nature of these experiments requires the charging of the generator and the subsequent data analysis to be performed repetitively. The automation of the procedure frees the experimenter for other tasks.

32381 **(CONF-8205152—) 6th conference on telemetry.** (Arbeitskreis Telemetrie e.V., Wessling (Germany, F.R.)). 1982. 436p. NTIS (US Sales Only), PC A18/MF A01. Order Number DE83901188.

From 6. conference on telemetry; Garmisch-Partenkirchen, F.R. Germany (10 May 1982).

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Separate abstracts were prepared for three papers in this conference proceedings.

32382 **(KFK—3371) Ratio pyrometer for temperatures of 500°C and above.** Rapp, W. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Hauptabteilung Datenverarbeitung und Instrumentierung). Jul 1982. 43p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750036.

The condition for a reasonable use of radiation-pyrometers is the harmony of the physical peculiarities of the object of measurement, the place of measurement and the radiation measurement device. In this paper the attempt will be made to point out the fundamentals of these interactions and to elucidate them by the considerations about design and application of two wavelength pyrometers. A ratio pyrometer developed at the KfK with an Si-photodiode as the radiation detector and the two optical wavelengths of 950 nm and 1080 nm will be described. This pyrometer has been designed to measure temperatures of 500°C and above through environmental media of variable densities. These optical filters combined with an Si-diode as the radiation sensor are optimum with respect to the lower temperature measurement limit, the resolution of temperature, the speed of measurement and the spectral absorption of water vapour. The need of a very constant temperature of the Si-photodiode has been accepted. By defined switching of the damping factors of the radiation intensity this pyrometer can be used as a spectral pyrometer. A suitable compensation of background radiation allows to devide the two spectral radiation intensities with minimum error at high dynamic of the radiation intensity.

32383 **(LA-UR—83-1113) Development of a point-electrode conductivity salinometer with high-spatial-resolution for use in very-saline solutions.** Jones, G.F.; Grimmer, D.P.; Tafoya, J.; Fitzgerald, T.J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 8p. (CONF-830622—7). NTIS, PC A02/MF A01. Order Number DE83011170.

From American Solar Energy Society meeting; Minneapolis, MN, USA (1 Jun 1983).

A conductivity probe and circuit were developed to measure salinities in sodium chloride salt-gradient solar ponds. A point-electrode salinometer design was chosen to give a spatial resolution of approximately 1 mm (0.039 in.). Such high spatial resolution was necessary to study the behavior of thermohaline columns in the vicinity of convective/conductive zone boundaries. The point-electrode conductivity instrument was designed for use in up to 25 wt % salinities with immersion times of about 0.1 year or longer. Drift in the instrument, however, caused principally by changes in the surface condition of the platinum probe tip and reflected by changes in the probe cell constant, required periodic in situ calibration against the measured specific gravity of withdrawn fluid samples.

32384 **Long-life leak standard assembly.** Basford, J.A.; Mathis, J.E.; Wright, H.C. (to Dept. of Energy). US Patent 4,343,176. 10 Aug 1982. Filed date 12 Nov 1980. vp.

PAT-APPL-206222.

The present invention is directed to a portable leak standard assembly which is capable of providing a stream of high-purity reference gas at a virtually constant flow rate over an extensive period of time. The leak assembly comprises a high pressure reservoir coupled to a metal leak valve through a valvecontrolled conduit. A reproducible leak valve useful in this assembly is provided by a metal tube crimped with a selected pressure loading for forming an orifice in the tube with this orifice being of a sufficient size to provide the selected flow rate. The leak valve assembly is formed of metal so that it can be "baked-out" in a vacuum furnace to rid the reservoir and attendent components of volatile impurities which reduce the efficiency of the leak standard.

32385 **Photoactive coating for hardening optical fibers.** Caldwell, R.S. US Patent Application 6-403,215. 29 Jul 1982. 16p.

In accordance with the foregoing principles and objects of the present invention, an improved optical fiber structure is provided which is hardened against the effects of ionizing nuclear radiation and comprises a conventional plastic, glass or silica optical fiber core and cladding, having an additional outer coating comprising phosphorescent or luminescent material for interacting with the ionizing radiation to provide a source of light to optically bleach the fiber core of optical absorption sites produced as a result of the interaction of the ionizing radiation with the fiber core material.

4404 Well Logging Instrumentation

REFER ALSO TO CITATION(S) 31103, 31176

32386 **(PNL—4620) Well-logging probe for measuring tritium: construction and operating manual.** Menninga, C.; Brodzinski, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 22p. NTIS, PC A02/MF A01. Order Number DE83011471.

This document describes the as-built construction and operating procedures for a well-logging instrument capable of measuring tritium in situ in a well or borehole as small as 3-inch schedule 40 pipe. A companion document, A Design Manual for a Well-Logging Probe Capable of Measuring Tritium, PNL-4069, should be referred to for all design information and drawings. This document contains sections describing changes made between the design and construction phases, the general configuration of the instrument, and step-by-step operating procedures. The instrument can sample air or water and can purify the sample from other radionuclides or chemical contaminants. The instrument will operate satisfactorily in the presence of a moderate gamma-ray background and can measure tritium concentrations as low as 50 pCi/ml of water in normal logging operations.

45 EXPLOSIONS AND EXPLOSIVES

4501 Chemical

32387 **(SAND—83-0730) Growth and decay of one-dimensional shock waves in chemically reacting multiphase mixtures.** Taylor, P.A. (Sandia National Labs., Albuquerque, NM (USA)). Apr 1983. Contract AC04-76DP00789. 75p. NTIS, PC A04/MF A01. Order Number DE83011134.

The behavior of one-dimensional shock waves in a chemically reacting, nondiffusing multiphase mixture, i.e., one in which the constituents may possess individual microstructure such as porosity and granularity was examined. Essential to this investigation is the introduction of the shock-evolution equation, which determines the local growth or decay of the shock wave in view of the dissipative and enhancive mechanisms involved. This equation accounts for the immiscibility and energy exchange between the constituents as associated with the microstructural properties of the mixture, along with the chemical reactivity at the shock front. Also presented are the constituent Hugoniot properties and associated remarks within the context of a multiphase mixture theory.

32388 **Explosive composition comprising pentaborane and tris (difluoramino) fluoromethane.** Grelecki, C.J.; Marcellis, A.W. (to Dept. of Energy). US Patent 4,376,665. 15 Mar 1983. Filed date 26 Feb 1964. vp.

PAT-APPL-347631.

A novel composition of matter is disclosed comprising a mixture of pentaborane and tris (difluoroamino) fluoromethane.

4502 Nuclear

REFER ALSO TO CITATION(S) 31316

32389 **(AD-A—120880/0) Integrated Warfare Requirements Methodology (IWRM). Phase I--feasibility study. Final report.** Makowski, P.; Gamble, S.J.; Beard, J.R.; Bruce, C.; Graves, H.K. (Army Concepts Analysis Agency, Bethesda, MD (USA)). 29 May 1981. 100p. NTIS, PC A05/MF A01.

The Integrated Warfare Requirements Methodology (IWRM) Feasibility Study was conducted to determine the feasibility of developing an integrated warfare requirements methodology, using currently available simulations, capable of supporting as European FY90 integrated requirements study programmed to begin in January 1983. This report provides the results of the feasibility study and culminates Phase I - Methodology Feasibility Study of IWRM.

32390 **(AD-A—121032/7) Nuclear testing and national security.** Fritzel, R.N. (National Defense Univ., Washington, DC (USA). Research Directorate). 1981. 117p. NTIS MF A01.

Since the 1950s, the United States has negotiated more than fifteen arms control agreements, several of which limited nuclear explosive testing by the signatories. Negotiations on another treaty on nuclear testing have been ongoing in Geneva since October 1977, between the United States, the Soviet Union, and the United Kingdom. This treaty would go beyond previous agreements limiting nuclear testing and impose a total ban on all nuclear explosive testing. Proponents of this Comprehensive Test Ban Treaty suggest that it will inhibit the further spread of nuclear weapons technology, lessen the superpower arms race, and be a stabilizing force in world affairs. This monograph contends that US support of this agreement is inconsistent with the US doctrine of strategic nuclear deterrence. Without testing to modernize US nuclear weapons, the United States cannot have an effective nuclear deterrent force.

32391 **(AD-A—121323/0) Military criteria for NATO TNF options for the 1980s.** Builder, C.H. (RAND Corp., Santa Monica, CA (USA)). May 1982. 14p. NTIS, PC A02/MF A01.

This analysis depends upon four simple ideas or assumptions. Each idea is an attempt to distinguish or discriminate between what is believed to be importantly different things. They are attempts to separate the problem in to pieces of differing characteristics and, hence, different solutions. These ideas are: Distinguishing Between NATO and Its Members; Distinguishing Between Nations; Distinguishing Between National Interests; and Distinguishing Between Nuclear Forces.

32392 **(AD-A—123276/8) The nuclearization of the Middle East and the subcontinent.** Ware, L.B. (Air Univ., Maxwell AFB, AL (USA). Library). Jun 1982. 68p. NTIS, PC A04/MF A01.

The nature of conventional warfare in the Middle East is changing. Contrary to the model of previous regional conflicts war consists now of attritional contests between states the political goals of which are no longer self-evident. Not only is this changed mode of warfare less responsive to megapolicies but because of the potential economic importance of the contestants the ability of normally minor states to develop significant action capabilities in the global arena has been notably enhanced. The possibilities for nuclear proliferation have, therefore, increased proportionally. This study seeks to document the development of regional nuclear options in a changed environment and to demonstrate the impact which the nuclear status of states outside the Middle East has had on the nuclearization of the traditional belligerents. A model of peacetime horizontal proliferation for the Middle East will be proposed and an attempt to fit this model to the strategy and tactics of nuclear deterrence under conditions of conflict will be made. Thus, it can be shown that a nuclear deterrent strategy based on mutual assured destruction is theoretically possible and, in point of practical fact, may be necessary for the long-term stability of the region. Concluding with the assertion that the actual state of bilateral relations between the superpowers is inadequate for the management of regional nuclearization in the event of uncontrolled escalation, this study will suggest that a global approach to the problem must be reformulated before the hypothetical becomes the real.

32393 **(AD-A—123423/6) Safety experiments November 1955 - March 1958. Technical report.** Massie, J.; Gravitis, I. (JRB Associates, Inc., McLean, VA (USA)). 2 Aug 1982. 80p. NTIS, PC A05/MF A01.

This report describes the 14 experiments with nuclear weapons to determine their susceptibility to fission due to accidents in storage and transportation. One of the tests (Project 57) was designed to develop effective monitoring and decontamination procedures in the event of non-nuclear detonation of a nuclear weapon. The tests were conducted during the following operational periods: in November 1955 and January 1956, during Operation PLUMBOB from April 1957 to October 1957, and in December 1957 and February and March 1958. DOD participation was limited to members of AFSWC and the Weather Bureau, some Exercise Desert Rock VII and VIII personnel, and DOD civilian and military scientists and technicians working for the AEC weapons development laboratories.

32394 **(AD-A—123441/8) Operation BUSTER-JANGLE, 1951. Technical report.** Ponton, J.; Rohrer, S.; Maag, C.; Shepanek, R.; Massie, J. (JRB Associates, Inc., McLean, VA (USA)). 21 Jun 1982. 191p. NTIS, PC A09/MF A01.

This report describes the activities of DOD military and civilian personnel in Operation BUSTER-JANGLE, the second series of atmospheric nuclear weapons tests conducted at the Nevada Proving Ground from 22 October through 29 November 1951. The BUSTER-JANGLE series consisted of seven events. DOD personnel participated in Excerises Desert Rock I, II, III and in scientific projects conducted by the test units. Radiological safety criteria and procedures were established and implemented during Operation BUSTER-JANGLE to minimize participants' exposure to ionizing radiation.

32395 **(AD-A—123684/3) Literature survey of blast and fire effects of nuclear weapons on urban areas. Final report.** Reitter, T.A.; McCallen, D.B.; Kang, S.W. (Lawrence Livermore National Lab., CA (USA)). Jun 1982. 109p. NTIS, PC A06/MF A01.

The purpose of this literature survey was to determine the state of knowledge of blast and fire effects of nuclear weapons on urban areas. This information should aid the planning of research in improving predictive capabilities and the development of mitigation and hardening measures. This report consists of summaries of our findings in four main areas: (1) attack scenario, thermal radiation and blast wave propagation; (2) ignition; (3) structural response and debris formation; and (4) fire spread and mass fire. Conclusions are given for each section, and our overall conclusions are presented at the end. The first appendix summarizes the relative state of knowledge, while the second appendix is a bibliography of relevant documents.

32396 **(AD-A—995171/6) Project Danny Boy. Permanent angular displacement of cylindrical models buried in basalt near an explosion crater. Final report.** Carlson, R.H.; Roberts, W.A. (Boeing Co., Seattle, WA (USA)). Jun 1962. 23p. NTIS, PC A02/MF A01.

No abstract available.

32397 **(CONF-830611—1) Big-hole drilling - the state of the art.** Lackey, M.D. (Reynolds Electrical and Engineering Co., Inc., Las Vegas, NV (USA)). 1983. Contract AC08-76NV00410. 11p. NTIS, PC A02/MF A01. Order Number DE83007538.

From Rapid excavation and tunneling conference; Chicago, IL, USA (12 Jun 1983).

The art of big-hole drilling has been in a continual state of evolution at the Nevada Test Site since the start of underground testing in 1961. Emplacement holes for nuclear devices are still being drilled by the rotary-drilling process, but almost all the hardware and systems have undergone many changes during the intervening years. The current design of bits, cutters, and other big-

hole-drilling hardware results from contributions of manufacturers and Test Site personnel. The dual-string, air-lift, reverse-circulation system was developed at the Test Site. Necessity was really the Mother of this invention, but this circulation system is worthy of consideration under almost any condition. Drill rigs for big-hole drilling are usually adaptations of large oil-well drill rigs with minor modifications required to handle the big bits and drilling assemblies. Steel remains the favorite shaft lining material, but a lot of thought is being given to concrete linings, especially precast concrete.

32398 **(UCID—19781) T and C Monitor System Upgrade management plan.** Brough, W.G. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 26p. NTIS, PC A03/MF A01. Order Number DE83010921.

The purpose of the T and C Monitor System Upgrade Project is to design and implement a monitor system which replaces and incorporates additional required functionality to the current T and C monitor system being used at the DOE's Nevada Test Site in conjunction with LLNL nuclear tests. This management plan defines the role, responsibility and level of authority for each of the three primary participants in the NTS T and C Monitor System Upgrade Project. The three primary participants are: the Department of Energy (DOE), the Lawrence Livermore National Laboratory (LLNL), and the EG and G Energy Measurments Group. This plan also defines the Technical, Cost, and Schedule Goals of the T and C Monitor System Project and the controls that each of the primary participants will have to ensure that those goals are met.

4503 Explosion Detection

32399 **(AD-A—120894/1) Research in seismology. Semi-annual technical report 1 Oct 76-31 Mar 77.** Mitchell, B.J.; Nuttli, O.W. (Saint Louis Univ., MO (USA)). 31 Mar 1977. 87p. NTIS, PC A05/MF A01.

Research for this program period has been concerned with the effect which various propagation effects and source properties have on the spectra and wave forms of body- and surface waves. The research is divided into four different but related reports which are presented in the following sections. The first report is concerned with the scaling of teleseismic P-wave ground-motion spectra of underground nuclear explosions. The second describes the use of Love waves as an explosion-earthquake discriminant. The third describes a method for modelling complex earthquakes and presents comparisons with observed data. The fourth reports work on assessing the effect of complex near-source structure on the wave forms of Rayleigh waves.

32400 **(AD-A—123664/5) The contribution of two-dimensional source effects to the far-field seismic signatures of underground nuclear explosions. Topical report.** Bache, T.C.; Barker, T.; Rimer, N.; Cherry, J.T. (Systems, Science and Software, La Jolla, CA (USA)). Jul 1980. 201p. NTIS, PC A10/MF A01.

Two-dimensional calculations of underground explosions are able to include free surface interaction effects and the depth dependence of overburden pressure and material properties, as well as the complex constitutive models for geologic materials developed in one-dimensional (spherically symmetric) studies. Eleven axisymmetric calculations of explosions in granite are analyzed in this study to determine the two-dimensional effects on the far-field body and surface waves and the magnitude mb and Ms. Seven of these are hypothetical 150 KT explosions at depths from 159 to 1000 meters calculated by Applied Theory, Inc. (ATI). These show depth effects that are different, though not strikingly so, from those calculated with one-dimensional source models. The other four calculations were done by Systems, Science and Software (S-Cubed). The first was for a specific event (PILEDRIVER), and the the depth and yield were varied for the other three. the near- and far-field data for PILEDRIVER were matched rather well, except that the spallation was too large in the calculation.

32401 **(UCID—19778) Measurement of seismic moments at the RSTN station RSSD for NTS explosions.** Taylor, S.R.; Patton, H.J. (Lawrence Livermore National Lab., CA (USA)). 5 Apr 1983. Contract W-7405-ENG-48. 17p. NTIS, PC A02/MF A01. Order Number DE83011215.

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We have estimated the seismic moment for two Nevada Test Site (NTS) explosions (Nebbiolo, 6/24/82; Atrisco, 8/5/82) at the Regional Seismic Test Network (RSTN) station in South Dakota (RSSD; distance from NTS ~ 1280 km). The moments are calculated from the vertical component mid-period channel for the Rayleigh waves and the merged mid- and short-period band for the P waves. The moment estimates from surface waves give values of 1.0×10^{25} and 2.0×10^{25} dyn-cm for Nebbiolo and Atrisco, respectively. The body-wave moments obtained at 0.5 Hz are approximately five times greater than those from surface waves and give values of 4.8×10^{25} and 1.0×10^{26} dyn-cm for Nebbiolo and Atrisco, respectively. The apparent discrepancy between the body and surface-wave moments can be resolved if there is overshoot (of 5:1) in the explosion source spectrum. As a check on the absolute value of the surface-wave moments, we compared them to moment values predicted from empirical moment-yield relationships for different emplacement media at NTS (Patton, 1983). We found that the agreement between observed and predicted values is satisfactory, within the measurement error on the moments at the one sigma level.

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC

5001 Basic Studies

REFER ALSO TO CITATION(S) 32427

32402 **(AEEW-R—1520) Production of methylene blue and sodium fluorescein aerosols with the May spinning top aerosol generator.** Mitchell, J.P.; Ramsey, C.A. (UKAEA Atomic Energy Establishment, Winfrith). Jan 1982. 29p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700307.

The May spinning top aerosol generator has been used to produce solid methylene blue and sodium fluorescein aerosols with diameters in the range 0.4 - 6μm. Liquid droplets from the spinning top are dried to give monodisperse particles with geometric standard deviations of less than 1.100 which are suitable for the calibration of aerosol analysis equipment.

32403 **(BNL—51632) Data report for the 1977 land-air-sea interaction experiments.** SethuRaman, S.; Henderson, C. (Brookhaven National Lab., Upton, NY (USA)). Aug 1982. Contract AC02-76CH00016. 166p. NTIS, PC A08/MF A01. Order Number DE83012451.

As part of the coastal Meteorological Studies, an extensive air-sea interaction experiment was conducted about 5 km off the south shore of Long Island, New York from May to October 1977. Instrumentation at the buoy measured mean meteorological variables, turbulence, wind profile, sea surface temperature and buoy motion. The data were telemetered continuously to the Shore Station at Tiana where they were recorded in magnetic tapes for later processing. Turbulence data were also obtained at a 24 m tower at the beach and the information recorded simultaneously with the buoy observations. Statistical parameters obtained by analyzing these data are presented in this report.

32404 **(CONF-811091—4) Data interpretation for model development and validation.** Hicks, B.B. (National Oceanic and Atmospheric Administration, Oak Ridge, TN (USA). Atmospheric Turbulence and Diffusion Lab.). Jul 1982. Contract AI05-76EV03688. 11p. NTIS, PC A02/MF A01. Order Number DE83010018.

From Workshop on parameterization of mixed layer diffusion; Las Cruces, NM, USA (20 Oct 1981).

An overview of the current understanding of turbulence in earth atmosphere is presented with emphasis on modeling methodology and data interpretation. (PSB)

32405 **(CONF-811091—5) Survey of the utility of laboratory modeling of atmospheric boundary-layer dispersion and related phenomena.** Hosker, R.P. Jr. (National Oceanic and Atmospheric Administration, Oak Ridge, TN (USA). Atmospheric Turbulence and Diffusion Lab.). Jul 1982. Contract AI05-76EV03688. 13p. NTIS, PC A02/MF A01. Order Number DE83010023.

From Workshop on parameterization of mixed layer diffusion; Las Cruces, NM, USA (20 Oct 1981).

An overview of the modeling efforts plus laboratory methods is presented. Sections correspond to typical boundary layer dispersion problems. (PSB)

5002 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 31095, 31145, 31605, 32160, 32270, 32273, 32370, 32375, 32426, 32429, 32431, 32437, 32438, 32455, 32598

32406 **(AD-A—123653/8) COCHISE observations of O3 formed by three-body recombination of O and O2. Environmental research papers.** Rawlins, W.T.; Armstrong, R.A. (Air Force Geophysics Lab., Hanscom AFB, MA (USA)). 17 Sep 1982. 19p. (AFGL-TR—82-0273; AFGL-ERP—795). NTIS, PC A02/MF A01.

Infrared spectra of the v3 mode of ozone formed in the three-body recombination of O-atoms and O2 have been observed in the cryogenic COCHISE facility. Temperature and pressure effects have been investigated. Correlations with field experiments are presented along with high-altitude LWIR emission implications.

32407 **(BMFT-FB-HA—82-022) Clarification of the physical and chemical nature of ultrafine aerosols, their generation during different industrial processes, and their retention in the respiratory tract.** Reiter, R.; Poetzl, K.; Kanter, H.J. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). 1982. 91p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750245.

With regard to the subject studies have been conducted of ultrafine aerosols $< 0{,}1$ μm oe. These remained unconsidered till today in the industrial hygiene for lack of adequate detection methods. Objectives of work: 1. Development of measuring techniques suitable for the purpose of detecting particle spectra from < 10 to < 0.03 μm oe; particle size-dependent sampling and analysis of the chemical aerosols matrix and retention in the sections of the respiratory tracts. 2. Corresponding studies in ironworks considering enrichment of toxic heavy metals in ultrafine aerosols, specifically during thermal processes (36 measuring points). Methods: Particle spectra detection through a light scattering system (coarse amount) and condensation nuclei counting (ultrafine amount), sampling of total dust and 2 ultrafine aerosol fractions, exposition of a retention simulator. Wet-chemical and X-ray fluorimetric aerosol analysis. Results: Confirmation of the wide-spread occurrence of ultrafine aerosols and the expected heavy metal enrichments up to one order of magnitude. Conclusion: universal validity of the results. On account of the industrial-hygienic significance continuation of the studies on a broader scale is recommended.

32408 **(CONF-821136—23) Eddy-correlation measurements of the dry deposition of particulate sulfur and submicron particles.** Wesley, M.L.; Cook, D.R.; Hart, R.L.; Hicks, B.B.; Durham, J.L.; Speer, R.E.; Stedman, D.H.; Tropp, R.J. (Argonne National Lab., IL (USA); National Oceanic and Atmospheric Administration, Oak Ridge, TN (USA). Atmospheric Turbulence and Diffusion Lab.; Environmental Protection Agency, Research Triangle Park, NC (USA); Michigan Univ., Ann Arbor (USA). Dept. of Atmospheric and Oceanic Science; Texas Univ., Austin (USA). Dept. of Chemical Engineering). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83010793.

From 4. international conference on precipitation scavenging, dry deposition and resuspension; Santa Monica, CA, USA (29 Nov 1982).

Results are summarized on direct eddy-correlation measurements of deposition velocities of particulate sulfur found on three occasions over grass, once over a pine forest, and once over a deciduous forest in wintertime. Also, the relationship of particulate sulfur flux to the air-surface exchange of other submicron particulate materials is considered.

32409 **(CONF-830307—16) Measurement of subgrid-scale eddy diffusivity.** Sheih, C.M.; Frenzen, P.; Coulter, R.L. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 2p. NTIS, PC A02/MF A01. Order Number DE83010796.

From 6. American Meteorological Society symposium on turbulence and diffusion; Boston, MA, USA (22 Mar 1983).

The dispersive effects of a broad range of turbulent eddy scales on the development of mean velocity distributions (or mean concentration distributions of scaler additives) are commonly incorporated in descriptions of larger scale flows as an eddy diffusivity. An objective method of measurement of subgrid-scale eddy diffusivity has been proposed. The subgrid-scale eddy diffusivity was formulated with an analogy drawn between Lagrangian relative diffusion theory and the Eulerian subgrid-scale parameterization problem. It uses the fact that the distances between particles suspended in a turbulent flow act as high-pass filters on the spectra of turbulent circulations that cause them to disperse. As a result, the average rate of growth of the distance between any two such particles in a dispersing ensemble (or puff) at any particular instant is largely attributable to scales of motion smaller than their particular separation distance at that time. Fluid motions of significantly larger scale contribute essentially the same velocity to each particle, while only those fluctuating motions with scales smaller than the separation distance are able to move individual members of the particle pairs independently in the near-random manner that causes the root-mean-square separation distance of all particles in the ensemble to increase with time, that is, in the manner which causes a puff of tracer material suspended in a turbulent fluid to disperse.

32410 **(DOE/EV/10379—1) Influence of water vapor on climate due to an increase in atmospheric carbon dioxide. Final report, January 1, 1980-December 1, 1982.** Kuhn, W.R. (Michigan Univ., Ann Arbor (USA)). Mar 1983. Contract AC02-80EV10379. 76p. NTIS, PC A05/MF A01. Order Number DE83010999.

Water produces a significant greenhouse effect, not only in the vapor phase but also as a solid or liquid in the form of clouds. Water-vapor concentrations and cloud height and amount depends upon temperature which increases for a doubling of CO_2. The change in temperature caused by the different water vapor concentrations and clouds was the purpose for this study. A mean global lapse rate is better approximated by the moist adiabatic or Rennick parameterization than one of 6.5°K/km. Both give a higher surface temperature (1.3°K and 1.6°K respectively) than does the commonly assumed lapse rate of 6.5K/km. Furthermore the sensitivity to a doubling of CO_2 is reduced being about 0.8K for a moist adiabatic lapse rate and 1.5°K for a Rennick parameterization. The assumption of a critical moist adiabatic lapse rate at low latitudes and a lapse rate for baroclinic adjustment at high latitudes both give a temperature increase of about 0.8°K for a doubling of CO_2 although surface temperatures for present day CO_2 do not agree well with observed temperatures. A global model that calculates cloud heights and water vapor also yields a temperature increase of 0.8K for a doubling of CO_2. Thus we suggest that the lower limit for the uncertainty in temperature due to a doubling of CO_2 be revised downward to 0.8°K.

32411 **(EPRI-EA—1901-Vol.1) Sulfate Regional Experiment: report of findings. Volume 1. Final report.** Mueller, P.K.; Hidy, G.M. (Environmental Research and Technology, Inc., Westlake Village, CA (USA)). Mar 1983. 352p. NTIS, PC A16/MF A01. Order Number DE83901847.

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The Sulfate Regional Experiment (SURE) project is described and results analyzed. Field studies ran from August 1977 to

October 1978. SURE contains four elements: a ground monitoring network of 54 randomly distributed stations throughout the northeastern United States; a program of measuring air quality using instrumented aircraft; a detailed emissions inventory; and a modeling program. While emphasis was placed on sulfur compounds, measurements also included nitrogen compounds, ozone, hydrocarbons and particulate carbon. The aircraft work served as a limited supplement to the ground network in an attempt to add a three-dimensional character to the aerometric measurements. Emissions were reported as daily averages for each season of the year, with hourly SO_2 values for major sources during the seasonal study months. The modeling effort was aimed at developing a system which calculates regional concentrations of pollutants in terms of local emissions, taking into consideration other factors such as pollutant transport, chemical reactions, and meteorology.

32412 **(EPRI-EA—1901-Vol.2) Sulfate Regional Experiment: report of findings. Volume 2. Final report.** Mueller, P.K.; Hidy, G.M. (Environmental Research and Technology, Inc., Westlake Village, CA (USA)). Mar 1983. 231p. NTIS, PC A11/MF A01. Order Number DE83901924.

Detailed documentation of the SURE project including its design, implementation, data analyses and modeling, and results is presented. (PSB)

32413 **(EPRI-EA—1901-Vol.3) Sulfate Regional Experiment: report of findings. Volume 3. Final report.** Mueller, P.K.; Hidy, G.M. (Environmental Research and Technology, Inc., Westlake Village, CA (USA)). Mar 1983. 395p. NTIS, PC A17/MF A01. Order Number DE83901980.

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Detailed documentation of the SURE project including its design, implementation, data analyses and modeling, and results. (PSB)

32414 (INIS-mf—7550, pp vp) **Measurement of ^{85}Kr in the atmosphere by the cryogenic-chromatographic method.** Cimbak, S.; Chudy, M.; Povinec, P. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32415 **(KFK—3329) Studies on the formation of sulfurous aerosol particles: The influence of heterogeneous SO_2-oxidation.** Dlugi, R. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Lab. fuer Aerosolphysik und Filtertechnik 1). Apr 1982. 222p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750248.

Portions are illegible in microfiche products; Disseration submitted to Heidelberg Univ., Germany, F.R.

The relevance of some particle formation mechanisms is discussed for sulfuric acid and some sulfates, based on the results of a study of the formation of sulfuric aerosol particles in the atmosphere and on an analysis of atmospheric particle samples. In particular the conditions are described under which a larger portion of the SO_2 molecular can be oxidized on aerosol particle surfaces to sulfuric acid and sulfates.

32416 **(LA-UR—83-636) Copper smelters and atmospheric visibility in the southwest, seasonal analysis.** Nochumson, D.H.; Williams, M.D. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 36p. (CONF-830617—4). NTIS, PC A03/MF A01. Order Number DE83009913.

From 76. annual meeting of the Air Pollution Control Association; Atlanta, GA, USA (19 Jun 1983).

This paper presents the results of the seasonal analysis from a study which has evaluated the effects of copper smelter emissions on atmospheric visibility in southwestern national parks and wilderness areas. The study also examined these effects on an episodic basis and conducted statistical analyses of aerosol and visibility measurement data before and during the summer 1980 copper strike. Copper smelters have been the major emitters of sulfur oxides (SO/sub x/) in the Southwest. The contribution of the copper smelters to visibility reduction versus all other contributions, natural as well as anthropogenic, is estimated at selected locations. This study was initiated to evaluate the effectiveness of the constant emission control (CEC) strategy in improving visibility at southwestern national parks and wilderness areas. The southwestern states of Arizona, Nevada, New Mexico, and Utah are implementing the CEC strategy to control SO/sub x/ emissions from copper smelters as part of their state implementation plans (SIP).

32417 **(LIS—2) Boundary conditions for air quality evaluation.** Buck, M. (Landesanstalt fuer Immissionsschutz des Landes Nordrhein-Westfalen, Essen (Germany, F.R.)). 1978. 44p. (In German). Available from Landesanstalt fuer Immissionsschutz des Landes Nordrhein-Westfalen, Essen (Germany, F.R.).

From the results of air quality surveillance measurements carried out since 1964 by the LIS in Nordrhein-Westfalen (Measuring Programs 3 and 4) it is shown that widely differing interpretations concerning air quality for the following air pollutants can be made when, according to the directions of TA-Luft 1974, the values I_1 and I_2 are taken as characteristics for the pollution load based on different-sized areas and compared with one and the same IW_1 and IW_2 values: sulfur dioxide, fluorine compounds, organic compounds (total C), and hydrogen sulfide. Moreover, experimental results on sulfur dioxide show, that according to TA-Luft 1974 seemingly equivalent methods of measurement for ambient air, namely: 1. uninterrupted measurements at one measuring site in an area of 16 km^2 size (continual measurements) carried out expedientlly with automatic instruments, 2. incomplete measurements (as regards time) at 16 measuring sites in an area of 16 km^2 size (random sample measurements) carried out usually with discontinuous methods cannot be considered as being equivalent because these methods show structural differences leading to significantly different informations on air pollution.

32418 **(NP—3901177) Experimental study of NaCl-aerosol production from the vapor phase.** Kettmann, G. (Max-Planck-Institut fuer Stroemungsforschung, Goettingen (Germany, F.R.)). May 1982. 83p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83901177.

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In this work the production of NaCl-aerosols by spontaneous condensation from the vapor phase has been studied. An aerosol generator has been developed which produces a large number of particles within a broad range of radii. To a large amount the aerosols are mono-dispersive with a radius distribution resembling a normal distribution. These properties, and in particular the spherical shape of the particles, allow many applications, first of all in the field of laser-doppler-anemometry. Photographs of particle samples have been obtained by electron microscopy to determine the radii and the number densities of the aerosols. Increasing particle radii are observed with decreasing flow velocity of the transporting gas and with increasing salt temperature, which, in both cases results in a lower particle number density. These findings are in qualitative agreement with the theory of nucleation and droplet growth.

32419 **(PNL-SA—10606) Time-dependent model of pollutant transport and diffusion in mountain valleys.** Whiteman, C.D.; Allwine, K.J. (Pacific Northwest Lab., Richland, WA (USA)). Nov 1982. Contract AC06-76RL01830. 16p. (CONF-830307—17). NTIS, PC A02/MF A01. Order Number DE83010346.

From 6. American Meteorological Society symposium on turbulence and diffusion; Boston, MA, USA (22 Mar 1983).

A new valley air-pollution model has been developed to predict short-term concentrations of nonreactive pollutant species on the valley floor and sidewalls resulting from a continuous elevated source located within a valley. The model was developed for use when the effects of local heating and cooling dominate the valley meteorology and the influence of synoptic circulations is weak. The physical processes acting to disperse pollutants during the nighttime steady-state period and the period of post-sunrise temperature inversion breakup are parameterized in modules within the model. The primary physical processes included in the model are nocturnal down-valley transport and enhanced diffusion of pollutants, plume

channeling, plume dilution due to clean air flowing in from valley tributaries, and plume reflection from valley floor and sidewalls. Physical processes in the post-sunrise simulation include downvalley plume transport in the elevated remnant of the nocturnal temperature inversion, pollutant fumigation into growing convective boundary layers, subsidence in the valley atmosphere, and transport and diffusion of pollutants in upslope flows. This paper describes the physical processes incorporated in the model along with their parameterizations.

32420 **(SRD-R—229) Development of CRUNCH: a dispersion model for continuous releases of a denser-than-air vapour into the atmosphere.** Jagger, S.F. (UKAEA Risley Nuclear Power Development Establishment, Culcheth. Safety and Reliability Directorate). Jan 1983. 34p. United Kingdom Atomic Energy Authority, Wigshaw Lane, Culcheth Warrington, England.

Further consideration is given to the computer code CRUNCH - a model to describe the dispersion, in the atmosphere, of continuous releases of denser-than-air vapours. The duration of the release must be such that a steady state plume results. Model equations are reviewed and a guide to source term calculation given. Attempts to validate the model against available experimental data are described and analytical solutions to the model equations, for certain limiting conditions, are provided. CRUNCH is also compared with other similar working models.

32421 **(UCRL—88613) Is there climatic evidence now for carbon dioxide effects.** MacCracken, M.C. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 16p. (CONF-830617—1). NTIS, PC A02/MF A01. Order Number DE83009244.

From 76. annual meeting of the Air Pollution Control Association; Atlanta, GA, USA (19 Jun 1983).

This paper describes the status of the search for evidence that the climate is changing due to increasing atmospheric CO_2 concentrations. Global climate models project that doubling of atmospheric carbon dioxide concentrations will lead to a global warming of 3 +- 1.5°C. Over the last one-hundred years, the CO_2 concentration has risen from perhaps 290 ppmv or below to 340 ppmv. If the climate system were at equilibrium, logarithmic interpolation would suggest that a warming of 0.7 +- 0.35°C should have occurred. Analyses of temperature records over this period indicate that some warming has apparently occurred, but it is not yet possible to apportion climate changes over this period with confidence among volcanic, solar, and CO_2-induced components. Analyses of climatic indicators in addition to atmospheric temperature also do not yet provide either convincing evidence that the projected CO_2 effects are present or a clear refutation that climate model projections are incorrect.

32422 **(UCRL—88957) Air quality model validation: application to the San Francisco Bay Area and St. Louis.** Penner, J.E.; Walton, J.J.; Umeda, T. (Lawrence Livermore National Lab., CA (USA); Bay Area Air Quality Management District, San Francisco, CA (USA)). 1983. Contract W-7405-ENG-48. 22p. (CONF-830617—3). NTIS, PC A02/MF A01. Order Number DE83009805.

From 76. annual meeting of the Air Pollution Control Association; Atlanta, GA, USA (19 Jun 1983).

Complex urban-scale photochemical models are increasingly being used to predict air quality and the impacts of alternative emission control strategies. Yet confusion about acceptable levels of performance for these models still exists. A workshop was convened by the American Meteorological Society, for example, for the purpose of reviewing and recommending procedures for evaluating air quality models. They recommended a set of statistical measures for testing the accuracy of models but did not specify the accuracy required for acceptance or validation. This paper addresses the question of what quality of model performance is necessary for model validation. To study this question, we applied our urban-scale photochemical model to both the San Francisco Bay Area and St. Louis. While model performance is judged to be adequate, more work is needed to fully validate the model. This is because model performance is limited by the accuracy and representativeness of the input data.

32423 **Smog chamber studies of NO/sub x/ transformation rate and nitrate/precursor relationships.** Spicer, C.W. (Battelle Columbus Laboratories, OH). *Environmental Science and Technology;* **17**: No. 2, 112-120(Feb 1983).

An environmental chamber study of nitrogen oxide reactions is described. The aim of the investigation was to determine (1) the rate of NO/sub x/ transformation to nitrate products, (2) the environmental factors that influence the transformation rate, (3) the relationship between nitrate products and their hydrocarbon and NO/sub x/ precursors, and (4) relationships among NO/sub x/, O_3, and nitrates. The experiments made use of a 17-component hydrocarbon mixture designed to represent the major organic constituents of urban air. The results of the chamber experiments demonstrate that the transformation of NO_2 to nitrate products follows pseudo-first-order kinetics, and the transformation rate constant is proportional to the initial NMHC/NO/sub x/ ratio. Nitrogen balances of ≧90% were obtained when HNO_3 deposition to the chamber surface was taken into account. The fractional conversion of NO/sub x/ to products was shown to depend on initial NMHC/NO/sub x/. For this particular hydrocarbon mixture, the PAN/HNO_3 ratio was directly proportional to initial NMHC/NO/sub x/ for NHMC/NO/sub x/ ≦ 20. For a typical urban NMHC/NO/sub x/ ratio of 8, about 3 times as much HNO_3 as PAN is produced in the chamber. The implications and limitations of the experimental results are discussed.

32424 **Comparison of observed and predicted air concentrations for 18.6 μm fluorescein particles.** Little, C.A.; Miller, C.W.; Cotter, S.J. (Oak Ridge National Lab., TN (USA)). *Health Physics;* **43**: No. 3, 355-362(Sep 1982).

From 1967 to 1973, numerous atmospheric dispersion experiments were conducted at Hanford, Washington, by the staff of Battelle Pacific Northwest Laboratories. We compared published data from those experiments to predictions made by the Gaussian plume atmospheric dispersion model for conditions similar to the field releases. The express purpose of the study was to consider the effects of non-zero dry deposition parameters on the accuracy of the model predictions of ground-level normalized air concentrations by comparing these predictions to the published Hanford field observations. Predictions were made consistent with existing dose assessment practices. We conclude that for the conditions tested, the predictive capability of the model was most improved when the deposition velocity parameter (upsilonsub(d)) and the gravitational fall velocity (upsilonsub(g)) were both set equal to 1.8 cm/s.

32425 **Evaluation of EPA method 5 probe deposition and filter media efficiency.** Elder, J.C.; Tillery, M.I.; Ettinger, H.J. (Los Alamos Scientific Lab., NM). *Journal of the Air Pollution Control Association;* **31**: No. 1, 66-68(Jan 1981). Contract W-7405-ENG-36.

Efficiency of four glass fiber filter media commonly used in EPA Method 5 stack sampling, and probe deposition as a function of particle size and flow were evaluated as preliminary steps toward developing an improved extractive sampling method. These experiments investigated potential problem areas, such as filter efficiency at above ambient temperature. Method 5 is generally applied to the determination of total particulate mass emitted from stationary sources, typically power stations, incinerators, cement batching plants, pulp and paper mills, and the like. Particulate matter is withdrawn isokinetically by a heated probe inserted in the source stack and collected on glass fiber filters maintained at 120 +/- 14°C. Particulate mass is then determined gravimetrically by summing the moisture-free mass collected on the filter and the particulate mass washed from the probe.

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32426 **(ANL—83-26) Environmental monitoring at Argonne National Laboratory. Annual report for 1982.** Golchert, N.W.; Duffy, T.L.; Sedlet, J. (Argonne National Lab., IL (USA)). Mar 1983. Contract W-31-109-ENG-38. 106p. NTIS, PC A06/MF A01. Order Number DE83012460.

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The results of the environmental monitoring program at Argonne Ntaional Laboratory for 1982 are presented and discussed. To evaluate the effect of Argonne operations on the environment, measurements were made for a variety of radionuclides in air, surface water, soil, grass, bottom sediment, and milk; for a variety of chemical constituents in air, surface water, ground water, and Argonne effluent water; and of the environmental penetrating radiation dose. Sample collections and masurements were made at the site boundary and off the Argonne site for comparison purposes. Some on-site measurements were made to aid in the interpretation of the boundary and off-site data. The results of the program are interpreted in terms of the sources and origin of the radioactive and chemical substances (natural, fallout, Argonne, and other) and are compared with applicable environmental quality standards. The potential radiation dose to off-site population groups is also estimated.

32427 **(CEA-R—5158) Study of particle deposition in ducts - Optimisation of aerosol sampling pipes.** Charuau, J. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Inst. de Protection et de Surete Nucleaire). Mar 1982. 211p. (In French). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83700323.

The scope of this study was the optimisation of radioactive aerosol measurement, which is often carried out after the aerosol transport through pipes. The main physical laws governing aerosols and the basis of fluid mechanics are first recalled; the various data scattered in the literature on the deposition process of particles in ducts were gathered together. A slightly turbulent flow regime propitious to aerosol transfer was defined by in situ and laboratory experiments. Thanks to the great sensitivity of the method used to measure the deposition of fluorescent aerosols, a systematic experimental investigation was undertaken. The size of the monodisperse particles ranged from 10^{-2} to 10 μm, and their electrical charge state was made variable. The validity of the equations available for particle deposition in a laminar flow was verified and attempts were made to fill in the gaps on turbulent flow. For the optimal flow regime a set of simple equations was developed in order to forecast the deposition of particles of any size, any electrical charge, in any straight or bent horizontal or vertical cylindrical duct with conducting smooth walls. In the case of charged particles, the effects of roughness and insulating walls were studied.

32428 **(DOE/PN/00292—T3) Duquesne Light Company 1982 annual radiological environmental report. Volume 2.** (Duquesne Light Co., Shippingport, PA (USA)). 1982. Contract AC11-76PN00292. 125p. NTIS, PC A06/MF A01. Order Number DE83011526.

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This report describes the Radiological Environmental Monitoring Program conducted during 1982 in the vicinity of the Beaver Valley Power Station and the Shippingport Atomic Power Station. The Radiological Environmental Program consists of on-site sampling of water and gaseous effluents and off-site monitoring of water, air, river sediments, soils, food pathway samples, and radiation levels in the vicinity of the site. This report discusses the results of this monitoring during 1982. The results show that Shippingport Atomic Power Station and Beaver Valley Power Station operations have not adversely affected the surrounding environment.

32429 **(FERMILAB—83/29) Environmental monitoring report for calender year 1982.** Baker, S.I. (Fermi National Accelerator Lab., Batavia, IL (USA)). 1 May 1983. Contract AC02-76CH03000. 87p. NTIS, PC A05/MF A01. Order Number DE83011086.

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This report gives the results of the environmental monitoring program at Fermi National Accelerator Laboratory (Fermilab) for Calendar Year (CY-) 1982. Protons were accelerated to an energy of 500 GeV in 1976 and operation at 400 GeV is now routine. Operation of the accelerator produces some radiation which penetrates the shielding material as well as some airborne radioactivity. Also, some radioactivation occurs in the soil and in the water used to cool radioactive components. The emphasis has been placed on exposure pathways appropriate to high energy physics laboratories. These pathways include external exposure from direct penetrating radiation and airborne short-lived ^{11}C, and internal exposure from ^{3}H and ^{22}Na in water, primarily drinking water. Monitoring results are also reported for nonradioactive pollutants. Included as pollutants are pesticides used in weed, insect, rodent, and algae control. Also a corrosion inhibitor containing zinc and chromium (as chromate) was formerly used in one of the water systems. Discharge underground and subsequent surfacing required monitoring. Although the use of chromate has been discontinued, monitoring for chromate has continued in CY-1982. The CY-1982 result is reported as well as those from monitoring the performance of the sewage treatment plant on site.

32430 **(GAT/GDP—1111) Portsmouth Gaseous Diffusion Plant environmental monitoring report for calendar year 1982.** (Goodyear Atomic Corp., Piketon, OH (USA)). 27 Apr 1983. Contract AC05-76OR00001. 46p. NTIS, PC A03/MF A01. Order Number DE83012453.

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At the Portsmouth Gaseous Diffusion Plant all effluent streams are sampled regularly and analyzed to assess compliance with applicable environmental standards. Radioactivity is measured in air, water, food, soil, and sediments; and radiation doses to the public are calculated. All public radiation doses from process effluents are well within Department of Energy and US EPA standards. Non-radioactive effluents either presently comply with federal standards or will comply upon completion of planned projects. CY-1982 was the second full year under a new National Pollutant Discharge Elimination System (NPDES) permit for liquid effluents; compliance with the permit's discharge limits, with the exception of the high suspended solids in effluent from the South Holding Pond, did not present any significant problems. Engineering is proceeding on projects to be constructed through 1985 to further reduce the impact of liquid effluents. Although neither the State of Ohio nor the federal government has established standards for fluoride in the atmosphere or in vegetation, fluorides are monitored because they are used extensively in the gaseous diffusion process.

32431 **(GEPP-EM—729) Pinellas Plant environmental monitoring report, 1982.** (General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.). Apr 1983. Contract AC04-76DP00656. 38p. NTIS, PC A03/MF A01. Order Number DE83011341.

This report presents the results of the 1982 annual effluent and environmental monitoring program for the Pinellas Plant. Average maximum ground level concentrations of tritium, carbon 14 and krypton 85 were all less than 0.2% of the standard for continuous monoccupational exposure. Offsite releases of liquid effluents were analyzed for biochemical oxygen demand, suspended solids, fecal coliform bacteria, pH, nitrogen, phosphorus, arsenic, chlorides, chromium, copper, cyanides, detergents, fluorides, iron, lead, mercury, oil plus greases, phenols, turbidity and zinc. No plutonium was released to the environment and monitoring data showed background levels. Calculations were made to determine the radiation doses resulting from releases of tritium oxide, krypton 85 and carbon 14. (ASR)

32432 (INIS-mf—7550, pp vp) **Use of cryogenic air sampling in the spectroscopy of airborne gamma emitters.** Perdue, P.T.; Haywood, F.F. (Oak Ridge National Lab., TN (USA)). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32433 (INIS-mf—7550, pp vp) **Atmospheric Kr-85 concentration in Hungary from June 1975 to June 1980.** Csongor, E. (Magyar Tudomanyos Akademia, Debrecan. Atommag Kutato Intezete). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32434 (INIS-mf—7550, pp vp) **Time variations of low activities of technogenic radionuclides in the monthly fallouts.** Teneva, M.; Gheorghieva, L. (Bylgarska Akademiya na Naukite, Sofia. Inst. po Khidrologiya i Meteorologiya:; Dimchev, T. (Bylgarska Akademiya na Naukite, Sofia. Inst. za Yadrena Izsledvaniya i Yadrena Energetika). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32435 (Juel—1780) **Experimental determination of aerosol deposition velocity on vegetation and on other sampling areas.** Jonas, R.; Vogt, K.J. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Abt. Sicherheit und Strahlenschutz). Apr 1982. 79p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83750022.

The deposition velocity of aerosols with diameters between 0.4 and 17 μm, required for environmental exposure calculations, was experimentally determined in fifty-two field tests. The results of the deposition experiments on grass indicate that the deposition velocity is proportional to the friction velocity and depends on both the vegetation dry mass and on the aerosol diameter. The deposition velocity can be represented as an inverse polynomial function of the 3rd order as a function of the aerosol diameter. This demonstrated that the deposition velocity increases especially rapidly (by a factor of about 10) between diameters of 4 and 6 μm, for which turbulence deposition is characteristic, while the rise diminishes for larger particles, for which sedimentation is important. It can be assumed that in the normal operation of nuclear power stations and in the case of incidents in which radioactive substances are released in a filtered condition, a particle diameter of 3 μm is not exceeded and differences in friction velocity and dry mass are cancelled out in the temporal mean. At a mean friction velocity of 27 cm/s and a representative dry mass for grass of 0.017 g/cm^2 deposition velocities of 0.01, 0.02, 0.05, 0.42 and 4.6 cm/s resulted, corresponding to particle diameters of 1, 2, 3, 5 and 10 μm. This indicates that the reference value of 0.1 cm/s, given in the 'Allgemeine Berechnungsgrundlage' for the normal operation of nuclear power stations, is sufficiently conservative. The mean deposition velocity for clover was higher by a factor of approximately 2, for artificial interfaces (smooth and structured metals, filters) and soil by a factor of approximately 3 and thus 2 lower than for grass.

32436 (MHSMP—83-11) **Environmental monitoring report for Pantex Plant covering 1982.** Laseter, W.A. (Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)). Mar 1983. Contract AC04-76DP00487. 53p. NTIS, PC A04/MF A01. Order Number DE83011081.

This report summarizes the environmental monitoring program at Pantex Plant for 1982. Monitoring data for both radioactive and non-radioactive species in the local environment is presented. Plant activities involve the handling of significant quantities of uranium, plutonium, and tritium. However, only small releases of uranium (depleted in the isotope ^{235}U) and tritium occurred which could have affected the local environment. Monitoring data indicate that concentrations of these nuclides in the environment are below established criteria for air and water and therefore should not present a health hazard either to employees or to the public.

32437 (MLM—3055) **Environmental monitoring at Mound: 1982 report.** Carfagno, D.G.; Farmer, B.M. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 25 Apr 1983. Contract AC04-76DP00053. 51p. NTIS, PC A04/MF A01. Order Number DE83011211.

The environment locally surrounding Mound was monitored primarily for tritium and plutonium-238. The results are reported for 1982. Environmental mediums analyzed included air, water, vegetation, foodstuffs, and sediment. The average concentrations of plutonium-238 and tritium were within the applicable standards for radioactive species. Data concerning the emission of nonradioactive species into the atmosphere are also presented. All emissions were 7% or less of the applicable emissions standard. The dose commitment estimates indicate that, in all cases, the levels are at or within 1% of the DOE standard.

32438 (NLCO—1187) **Feed Materials Production Center environmental monitoring annual report for 1982.** Fleming, D.A.; Ross, K.N. (NLO, Inc., Cincinnati, OH (USA)). 1 May 1983. Contract AC05-76OR01156. 37p. NTIS, PC A03/MF A01. Order Number DE83011022.

This report contains environmental monitoring data collected at the Feed Materials Production Center (FMPC) during 1982. These data show that the discharges of radioactive contaminants from FMPC operations were only a fraction of the Department of Energy guide levels published in DOE Order 5480.1A. The resulting offsite radiation exposures were therefore, a small fraction of the standards for uncontrolled areas. Concentrations of environmentally important nonradioactive contaminants in water and air are also reported. Results show that FMPC operations did not cause state standards for these contaminants to be exceeded.

32439 (NRPB-R—122) **Procedure to include deposition in the model for short and medium range atmospheric dispersion of radionuclides. The second report of a working group on atmospheric dispersion.** Jones, J.A. (National Radiological Protection Board, Harwell (UK)). Sep 1981. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700312.

This report is the second of a series which gives practical guidance on the estimation of the dispersion of radionuclides released to the atmosphere. It represents the conclusions of a Working Group established to review recent developments in atmospheric dispersion modelling and to propose models for use within the UK. Methods described in this report are considered suitable for including dry and wet deposition in the models suggested in the groups first report for short and medium-range dispersion.

32440 (NRPB-R—123) **Estimation of long range dispersion and deposition of continuous releases of radionuclides to atmosphere. The third report of a working group on atmospheric dispersion.** Jones, J.A. (National Radiological Protection Board, Harwell (UK)). Oct 1981. 25p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700313.

This report is the third in a series giving practical guidance on the estimation of the dispersion of radioactive material released to the atmosphere. It represents the conclusions of a Working Group established to review recent developments in atmospheric dispersion modelling and to propose models for use within the UK. This report describes a method considered suitable to extend the models described in the first and second reports for dispersion and deposition at short and medium range to long range for continuous releases.

32441 (NRPB-R—124) **Model for long range atmospheric dispersion of radionuclides released over a short period. The fourth report of a working group on atmospheric dispersion.** Jones, J.A. (National Radiological Protection Board, Harwell (UK)). Nov 1981. 9p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700314.

This report is the fourth in a series which gives practical guidance on the estimation of the dispersion of radioactive material

released to the atmosphere. It represents the conclusions of a Working Group established to review recent developments in atmospheric dispersion modelling and to propose models for use within the UK. This report describes a model considered suitable for calculating dispersion at long range from releases of short duration.

32442 **(PB—83-150672) Emissions of naturally occurring radioactivity from aluminum and copper facilities. Report No. 6 (final).** Andrews, V.E. (Office of Radiation Programs, Las Vegas, NV (USA)). Nov 1982. 37p. NTIS, PC A03/MF A01.

This report summarizes five surveys which were conducted at a Bauxite mining operation, an alumina reduction plant, an aluminum reduction plant, an underground copper mine and mill, and an open pit copper mine and concentrator. Process components and controlled source releases were sampled for naturally occurring radioactivity. Particular emphasis was given to radon-222, lead-210, and polonium-210 emissions from crushing and drying processes.

32443 **(PB—83-150680) Emissions of naturally occurring radioactivity: underground zinc mine and mill. Report No. 2 (final).** Andrews, V.E. (Office of Radiation Programs, Las Vegas, NV (USA)). Nov 1982. 33p. NTIS, PC A03/MF A01.

Atmospheric emissions of naturally occurring radioactivity were measured from an underground zinc mine and mill. The only significant radioactive emission from the mine or mill was radon-222. An estimated 230 curies of radon-222 is released annually from the mine. The primary source of radon is believed to be the high influx of water which is pumped from the mine at the rate of 110 cubic meters per minute.

32444 **(PB—83-150698) Emissions of naturally occurring radioactivity: Monsanto elemental phosphorus plant. Report No. 4.** Andrews, V.E. (Office of Radiation Programs, Las Vegas, NV (USA)). Nov 1982. 36p. NTIS, PC A03/MF A01.

Naturally occurring radioactivity was measured in the atmospheric emissions and process materials of a thermal phosphate (elemental phosphorus) plant. Representative exhaust stack samples were collected from each process in the plant. The phosphate ore contained 12 to 20 parts per million uranium. Processes, emission points, and emission controls are described. Radioactivity concentrations and emission rates from the sources sampled are given.

32445 **(PB—83-152512) Environmental radiation data: report 27 (July-September 1981).** (Environmental Protection Agency, Montgomery, AL (USA). Eastern Environmental Radiation Facility). Dec 1981. 86p. (EPA—520/5-82-016). NTIS, PC A05/MF A01.

Environmental Radiation Data (ERD) is compiled and published quarterly (five months after the quarter being monitored). The report includes data from the Environmental Radiation Ambient Monitoring System (ERAMS) and similar networks operated by contributing states. The ERAMS monitors environmental media for radioactive contaminants in air, precipitation, surface water, drinking water, and milk samples collected by state and local agencies throughout the United States. Specific radiochemical analyses include gross alpha, gross beta, gamma, tritium, 14C, 85Kr, 131I, 89-90Sr, 226Ra, 238-239Pu, and 234-235-238U. All data and associated 2 sigma counting errors are reported in standard units. Precision and accuracy of the date are ensured by duplicate analyses and participation in internal and external quality assurance programs.

32446 **(PB—83-153601) Environmental radiation data: report 25-26 (January-June 1981).** (Environmental Protection Agency, Montgomery, AL (USA). Eastern Environmental Radiation Facility). Oct 1981. 99p. (EPA—520/5-82-015). NTIS, PC A05/MF A01.

Environmental Radiation Data (ERD) is compiled and published quarterly (five months after the quarter being monitored). The report includes data from the Environmental Radiation Ambient Monitoring System (ERAMS) and similar networks operated by contributing states. The ERAMS monitors environmental media for radioactive contaminants in air, precipitation, surface water, drinking water, and milk samples collected by state and local agencies throughout the United States. Specific radiochemical analyses include gross alpha, gross beta, gamma, tritium, 14C, 85Kr, 131I, 89-90Sr, 226Ra, 238-239Pu, and 234-235-238U. All data and associated 2 sigma counting errors are reported in standard units. Precision and accuracy of the date are ensured by duplicate analyses and participation in internal and external quality assurance programs.

32447 **(PB—83-155317) Emissions of naturally occuring radioactivity: Stauffer elemental phosphorus plant.** Andrews, V.E. (Office of Radiation Programs, Las Vegas, NV (USA)). Nov 1982. 36p. NTIS, PC A03/MF A01.

Naturally occurring radioactivity was measured in the atmospheric emissions and process materials of a thermal phosphate (elemental phosphorus) plant. Representative exhaust stack samples were collected from each process in the plant. The phosphate ore contained about 120 parts per million uranium. The radioactivity emitted in greatest quantity was radon-222 with an annual release from the plant of 8.3 curies. Emissions of lead-210 and polonium-210 were measured at 280 and 200 millicuries per year. Annual emissions of each of the other radionuclides of the uranium decay chain were estimated to be 4.2 millicuries. The slag pile was determined not to be a source of radon.

32448 **(PNL-SA—11186) Airborne radioactive source terms in compartment fires.** Owczarski, P.C.; Chan, M.K.W.; Ballinger, M.Y. (Pacific Northwest Lab., Richland, WA (USA)). 25 Feb 1983. Contract AC06-76RL01830. 15p. (CONF-830442—1). NTIS, PC A02/MF A01. Order Number DE83010349.

From CSNI specialist meeting on interaction of fire and explosion with ventilation systems in nuclear facilities; Los Alamos, NM, USA (26 Apr 1983).

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Pacific Northwest Laboratory (PNL) has developed source terms for the releases of radioactive aerosols during fires. The work was performed in a joint effort with Los Alamos National Laboratpry and Union Carbide Corporation to provide an accident analysis handbook on nuclear fuel cycle facilities for the US Nuclear Regulatory Commission. Source terms models were developed for the following release mechanisms: burning of contaminated combustible solids; burning of contaminated combustible liquids; heating of noncombustible contaminated surfaces; heating of unpressurized radioactive liquids; pressurized releases of radioactive powders; pressurized releases of radioactive liquids; spills of radioactive powders; and spills of radioactive liquids. Using an idealized burning model and incorporating compartment effects (boundary effects) with the above radioactive source models into a computer code (FIRIN1), PNL has performed a scoping analysis on the magnitude of airborne releases of radioactivity for a number of fuel cycle facility fires. The types of fires considered were general MOX facility fires involving glove boxes, stored combustible waste fires, and solvent extraction fires in waste reprocessing facilities. Several fire scenarios were developed for each fire type based upon the available ranges of both combustible and radioactive loadings in the compartment, as well as the sources of ignition and ventilation rates.

32449 **(RFP—3464) Environmental Sciences Branch semiannual progress report for July-December 1981.** Hunt, D.C. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 22 Apr 1983. Contract AC04-76DP03533. 52p. NTIS, PC A04/MF A01. Order Number DE83011597.

This report summarizes research and evaluation activities for the Environmental Sciences Branch from July 1, 1981 to December 30, 1981. Progress is reported in five primary areas: dust transport, distribution of transuranics in sediment, evaluation of critical ecological pathways for radionuclides, terrestrial ecosystem compartmentalization of plutonium and americium, and environmental health studies. Progress is also described in programs dealing with (1) plant land management, (2) meteorological suidies, (3) efficiency measurements on filter media used for environmental monitoring, (4) aerosol collection efficiency measurement on a sierra high-volume impactor sampler, (5) incident evaluation techniques using foliar deposition sampling, and (6) determination of loadings on plutonium plenum High Efficiency Particulate Air (HEPA) filters.

32450 **(SAND—83-0789) 1982 Environmental monitoring report, Sandia National Laboratories, Albuquerque, New Mexico.** Millard, G.C.; Gray, C.E.; Simmons, T.N.; O'Neal, B.L. (Sandia National Labs., Albuquerque, NM (USA)). Apr 1983. Contract AC04-76DP00789. 23p. NTIS, PC A02/MF A01. Order Number DE83011515.

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Because radionuclides are potentially released from its research activities, SNL has a continuing environmental monitoring program which analyzes for cesium-137, tritium, uranium, alpha emitter, and beta emitters in water, soil, air, and vegetation. Measured radiation levels in public areas were consistent with local background in 1982. The Albuquerque population received an estimated 0.170 person-rem from airborne radioactive releases, whereas it received greater than 50,400 person-rem from naturally occurring radionuclides.

32451 **(SCPRI-RM—10-1981) Monthly results of measurements, October 1981.** (Service Central de Protection contre les Rayonnements Ionisants, 78 - Le Vesinet (France)). 1981. 32p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700344.

Measurement tables concerning the surveillance of the environment in France (see also the SCPRI-RT--4-1981 report).

32452 **(SCPRI-RM—11-1981) Monthly results of measurements, November 1981.** (Service Central de Protection contre les Rayonnements Ionisants, 78 - Le Vesinet (France)). 1981. 32p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700345.

Measurement tables concerning the surveillance of the environment in France (see also the SCPRI-RT--4-1981 report).

32453 **(SCPRI-RM—12-1981) Monthly results of measurements, December 1981.** (Service Central de Protection contre les Rayonnements Ionisants, 78 - Le Vesinet (France)). 1981. 42p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700346.

Measurement tables concerning the surveillance of the environment in France (see also the SCPRI-RT--4-1981 report).

32454 **(SLAC—260) Annual environmental monitoring report, January-December 1982.** (Stanford Linear Accelerator Center, CA (USA)). Mar 1983. Contract AC03-76SF00515. 33p. NTIS, PC A03/MF A01. Order Number DE83011412.

Environmental monitoring results continue to demonstrate that environmental radiological impact due to SLAC operation is not distinguishable from natural environmental sources. During 1982, the maximum measured neutron dose near the site boundary was not distinguishable from the cosmic ray neutron background. There have been no measurable increases in radioactivity in ground water attributable to SLAC operations since operation began in 1966. Airborne radioactivity released from SLAC continues to make only a negligible environmental impact, and results in a site boundary annual dose of less than 0.3 mrem; this represents less than 0.3% of the annual dose from the natural radiation environment, and about 0.06% of the technical standard.

32455 **(Y/UB—18) United States Department of Energy Oak Ridge Facilities environmental-monitoring report.** (Union Carbide Corp., Oak Ridge, TN (USA). Office of Health, Safety, and Environmental Affairs). 1 May 1983. Contract W-7405-ENG-26. 68p. NTIS, PC A04/MF A01. Order Number DE83011598.

The Environmental Monitoring Program for the Oak Ridge area includes sampling and analysis of air, water from surface streams, creek sediments, biota, and soil for both radioactive and nonradioactive materials. Surveillance of radioactivity in the Oak Ridge environs indicates that atmospheric concentrations of radioactivity were not significantly different from other areas in East Tennessee. Concentrations of radioactivity in the Clinch River and in fish collected from the river wre less than one percent of the permissible concentration and intake guides for individuals in the offsite environment. While some radioactivity was released to the environment from plant operations, the concentrations in all of the media sampled were well below established standards. Surveillance of nonradioactive materials in the Oak Ridge environs shows that established limits were not exceeded for those materials possibly present in the air as a result of plant operations. The chemical water quality data in surface streams obtained from the water sampling program indicated that average concentrations resulting from plant effluents were in compliance with state stream guidelines with the exception of fluoride at monitoring Station E-1 which was 110 percent of the guideline and nitrate at Station B-1 which was 100 percent of the guideline. National Pollutant Discharge Elimination System (NPDES) permit compliance information has been included in this report. During 1982 there were no spills of oil and/or hazardous materials from the Oak Ridge installations reported to the National Response Center.

32456 **Environmental studies in conjunction with the construction of nuclear power plants Pt. 2. Summary and evaluation of computational models for the determination of the atmospheric migration of radioactive materials and environmental activity concentrations and for the estimation of the resulting radiation doses.** Horvath, L.G.; Bede, G.; Gacs, I. Budapest, Hungary; NIM Mueszaki Dokumentacios es Fordito Iroda (1980). 76p. (In Hungarian).

A status-of-the-art report is presented to summarize the studies in progress in Hungary concerning the radionuclide release of nuclear power plants and the motion and migration of radionuclides in the atmosphere. The presently available computerized models are described, their objectives, performances and advantages are discussed. Some examples are given to illustrate the applicability of the various models. They will be adapted to the local environmental, meteorological and architectural conditions of the Paks nuclear power plant under construction. The cooperation of research groups participating in the development or adaption of the different computerized models will continue during the start-up and operation of the Paks-1 reactor and the models will be improved on the basis of field experiences. New models will also be developed.

5006 Regulations

REFER ALSO TO CITATION(S) 31827

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL

5101 Basic Studies

REFER ALSO TO CITATION(S) 32603

5102 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 31211, 32429, 32605, 32632

5103 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 31301, 32136, 32426, 32428, 32429, 32430, 32436, 32438, 32445, 32446, 32449, 32450, 32595, 32768

32457 **(AECL—7512) Optimization of the analysis of chlorine-36 in urine.** Joseph, S.; Kramer, G.H. (Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.). Feb 1982. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700349.

A method has been developed and optimized for the analysis of chlorine-36 in urine. Problems such as sample size, photodecomposition of silver chloride and anion interferences have been solved and are discussed in detail. The analysis is performed by first removing interfering phosphates and sulphates from an untreated urine sample and isolating the chlorine-36 as silver chloride. The precipitate is counted in a planchet counter. Recoveries are estimated to be 90 +- 5% with a detection limit of 3 pCi (0.1 Bq) for a

routine sample (counting time 10 minutes, counting efficiency 10%, sample size 100 mL).

32458 **(EGG-HS—6213) Testing of portal monitors for personnel contamination control.** Johnson, L.O.; Gupta, V.P.; Stevenson, R.L.; Stalker, A.C.; Baker, K.R.; Littleton, M.L.; Rich, B.L. (Idaho National Engineering Lab., Idaho Falls (USA)). Apr 1983. Contract AC07-76ID01570. 36p. NTIS, PC A03/MF A01. Order Number DE83011441.

This is a report of an INPO-funded evaluation of state-of-the-art portal monitors used to detect personnel contamination. The project developed techniques and procedures to evaluate the performance and sensitivity of the portal monitors which provided data for intercomparison. An additional accomplishment was development of a methodology to assist manufacturers and users to optimize the monitor settings, and to provide technical basis for the eventual use of fixed monitors to replace frisking for contamination control. The monitors tested utilize thin-window gas-flow proportional counters sensitive to beta and gamma radiation. Various tests were performed: (1) background count rate and the statistical variability, (2) detector efficiency at different distances, (3) moving source sensitivity for various size sources and speeds, and (4) false alarm rates at different background levels. A model has been developed for the moving source measurements to compare the experimental data, and to test whether it is possible to adequately model the behavior of a portal monitor response to a moving source. The model results with the actual test results are compared.

32459 **(GSF-S—788) Migration of radionuclides in subsurface soil.** Bachhuber, H.; Bunzl, K.; Dietl, F.; Kretner, R.; Schimmack, W.; Schultz, W. (Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.). Inst. fuer Strahlenschutz). Aug 1981. 67p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750019.

The object of the investigations was to draw the most realistic conclusions about the spreading rate of the radionuclides Sr, I, Cs and Ce in a model accident contaminating the earth surface for various subsurface soils taken from the environment of the Gorleben salt done. The retardation factors were hence determined for these radionuclides in column tests in undisturbed soil samples and the distribution coefficients determined in disturbed soil samples by shaking tests (batch method). The following mobility series can be given very globally for the examined soil profiles where especially columnar-results had been used: Ranker (Trebel) J > Sr > Ce > Cs, Podsol (Gorleben) J > Cs > Sr > Ce, Braunerde (Bruenkendorf) J approx. >= Sr > Ce approx. >= Cs. Arable Soils: Podsol (Gorleben) J > Sr > Cs > Ce, Parabraunerde (Eschweiler) J > Sr > Ce approx. >= Cs.

32460 (INIS-mf—7499, pp vp) **Problems of natural radioactivity in homes.** Thomas, J. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32461 (INIS-mf—7499, pp vp) **Personnel dosimetry in Dukovany nuclear power plant. I. Health aspects of nuclear power.** Singer, J.; Velart, W. (Ceske Energeticke Zavody, Prague (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32462 **(UCRL—89037) Radiological-dose assessments of atolls in the northern Marshall Islands.** Robison, W.L. (Lawrence Livermore National Lab., CA (USA)). Apr 1983. Contract W-7405-ENG-48. 54p. NTIS, PC A04/MF A01. Order Number DE83012106.

The Marshall Islands in the Equatorial Pacific, specifically Enewetak and Bikini Atolls, were the site of US nuclear testing from 1946 through 1958. In 1978, the Northern Marshall Islands Radiological Survey was conducted to evaluate the radiological conditions of two islands and ten atolls downwind of the proving grounds. The survey included aerial external gamma measurements and collection of soil, terrestrial, and marine samples for radionuclide analysis to determine the radiological dose from all exposure pathways. The methods and models used to estimate doses to a population in an environment where natural processes have acted on the source-term radionuclides for nearly 30 y, data bases developed for the models, and results of the radiological dose analyses are described.

32463 **Theoretical and experimental considerations for the use of the column method for determining retardation factors.** Relyea, J.F. (Pacific Northwest Lab., Richland, WA (USA)). *Radioactive Waste Management and the Nuclear Fuel Cycle;* 3: No. 2, 151-166(Dec 1982).

The column method is used for direct measurement of retardation factors, which predict the mobility of trace elements, radionuclides and hazardous wastes in groundwater and soils. The author has found that retardation factors measured in column experiments depend on the water velocity and column dimensions. For short columns and water velocities, diffusion can become a major transport mechanism and breakthrough curves are shifted to the left (lower elution volume). At high velocities the effective pore volume of a sample can decrease for short columns. High water velocities can also shift breakthrough curves to the left (i.e., lower retardation factors) if adsorption equilibrium is not attained. Factors that cause these discrepancies are discussed and recommendations are made for the methods that should be used in conducting column experiments.

32464 **Environmental studies in conjunction with the construction of nuclear power plants Pt. 3. Investigation of typical land food chains for ^{131}I and ^{137}Cs radioisotopes.** Sztanyik, B.L.; Berczy, K.; Pajer, I.; Turai, I.; Szabo, Z. Budapest, Hungary; NIM Mueszaki Dokumentacios es Fordito Iroda (1980). 55p. (In Hungarian).

The expected effects of radionuclide release from the Paks nuclear power plant on the ecosystem are investigated. The expected ^{131}I and ^{137}Cs emission of the power plant under normal operational and break-down conditions are discussed. The food chains carrying the emitted radioisotopes are investigated in detail. The biological half-lives for different plants, animals and for man are investigated. The biological localization of radionuclides are measured. The natural biological indicators of different radionuclides are given. Radiation hazards including dose determination in the organisms are discussed. In addition to the normal radioisotope emission, the consequences of acute, high-quantity radionuclide release in cases of reactor failures are briefly reviewed.

32465 **Environmental studies in conjunction with the construction of nuclear power plants Pt. 1. Present level of radiation and radioactivity in the environment of the Paks nuclear power plant under construction (a state-of-the-art report).** Sztanyik, B.L.; Koeteles, G.; Nikl, I.; Stur, D.; Maschek, T.; Kurczne Csiky, I.; Turai, I.; Feher, I.; Andrasi, A. Budapest, Hungary; NIM Mueszaki Dokumentacios es Fordito Iroda (1980). 229p. (In Hungarian).

This state-of-the-art report summarizes experimental data concerning the existing background radiation and the radioactivity of different components in the environment (soil, air, surface waters, ground waters, building materials, animals, plants, food, human body) in the surrounding area of the Paks nuclear power plant. The sources of components of natural and artificial radioactivity are discussed. The data measured in Hungary are compared with those of world averages. The variation trends of different components of background radiation are determined. The presented data will be used as reference values for future environmental monitoring around the operating power plant.

32466 **CaF_2: Dy thermoluminescence dosimetry of natural environmental radiation with the example of the urban area of Erlangen.** Haselbek, G. Erlangen, Germany, F.R.; Erlangen-Nuernberg Univ. (1980). 78p. (In German).

Thesis.

The terrestrial radiation exposition of the population in the urban area of Erlangen is in the mean 37.3 +- 2.0 mrem/a; that

means 40 per cent of all the natural radiation exposition. The expenditure for this and the relatively expensive production of the dosimetercapsules can only be justified for the estimation of local dose-power profiles or personal doses via random samples.

5104 Thermal Effluents Monitoring And Transport

REFER ALSO TO CITATION(S) 31296

5105 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 31093, 31099, 31102, 31294, 31299, 31300, 32632

52 ENVIRONMENTAL SCIENCES, AQUATIC

5201 Basic Studies

REFER ALSO TO CITATION(S) 31102, 32116, 32403

32467 **(DPST—83-439-Vol.1) Preliminary Biological Measurement Program in the Savannah River. Final report, 1 March-31 August 1982. Volume I.** (Environmental and Chemical Sciences, Inc., Aiken, SC (USA)). Jan 1983. Contract AC09-76SR00001. 110p. NTIS, PC A06/MF A01. Order Number DE83012083.

This report presents the data obtained during the preliminary six months of the Biological Measurement Program in the Savannah River. A total of 10,205 fish eggs and larvae were collected in 2138 meroplankton samples from the Savannah River and tributary streams between 11 March and 29 August 1982. The 5176 fish larvae collected were primarily herring and shad. Unidentified minnows and spotted suckers were also very abundant. The 5029 fish eggs collected were primarily American shad. Striped bass and blueback herring were very abundant during a very short period. Both eggs and larvae were generally distributed uniformly in the water column. Peak spawning occurred in May. Striped bass spawning, which previously had not been recorded from the central Savannah River area, was noted on two occasions in May and one Occasion in July. Fourteen sturgeon larvae also were collected. To date, it has not been determined whether these larvae are Atlantic or shortnose sturgeon. Both Upper Three Runs and Steel Creeks were productive areas for fish spawning, whereas Four Mile Creek was seldom used for spawning. Entrainment of ichthyoplankton was calculated to be approximately 17.9×10^6 larvae and 18.1×10^6 fish eggs per day. The loss of ichthyoplankton is about 13% of the organisms that pass the intake. Impingement of fishes was low with a maximum of 44 fish impinged in a 24-hour period.

32468 **(FWS/OBS—82/04) Ecology of southeastern shrub bogs (pocosins) and Carolina bays: a community profile.** Sharitz, R.R.; Gibbons, J.W. (Savannah River Ecology Lab., Aiken, SC (USA)). Nov 1982. 105p. Fish and Wildlife Service, Division of Biological Services, Washington, DC 20240.

Shrub bogs of the Southeast occur in areas of poorly developed internal drainage that typically but not always have highly developed organic or peat soils. Pocosins and Carolina bays are types or subclasses of shrub bogs on the coastal plains of the Carolinas and Georgia. They share roughly the same distribution patterns, soil types, floral and faunal species composition and other community attributes, but differ in geological formation. Carolina bays may contain pocosin as well as other communities, but are defined more by their unique elliptical shape and geomorphometry. The pocosin community is largely defined by its vegetation, a combination of a dense shrub understory and a sparser canopy. The community is part of a complex successional sequence of communities (sedge bogs, savannas, cedar bogs, and bay forests) that may be controlled by such factors as fire, hydroperiod, soil type, and peat depth. Pocosins and Carolina bays harbor a number of animal groups and may be locally important in their ecology. Although few species are endemic to these habitats, they may provide important refuges for a number of species. These communities are simultaneously among the least understood and most rapidly disappearing habitats of the Southeast. Forestry and agricultural clearage are current impacts.

32469 **(PB—83-150029) Evaluation of the effectiveness of hydrogen and oxygen isotopes used in concert with chemical water-quality parameters as indicators of subsurface water movement and source.** Thurnblad, T.W. (Arizona Univ., Tucson (USA). Dept. of Hydrology and Water Resources). Sep 1982. 143p. NTIS, PC A07/MF A01.

A multiuse area, 15 miles south of Tucson, Arizona, was selected to test a water-pollution source assessment technique emphasizing the combined study of stable isotopes of water, major anions and cations, trace elements, pH, specific conductance, and water temperature. Computer-based analytical techniques were developed to identify data patterns indicating effects of recharge sources. The range in isotopic ratios along the study transect suggested that tracing surface-water recharge by its isotopic signature is possible, if density and frequency of sampling are sufficient. At some sites, water quality parameters were found to exceed state drinking-water supply standards. High sulfate concentrations were found in the surface water of mine pits and tailings ponds.

32470 **A simple model of deflection of the Gulf Stream by the Charleston Rise.** Rooney, D.M.; Janowitz, G.S.; Pietrafesa, L.J. (North Carolina State Univ., Raleigh). *Gulfstream;* 4: No. 11, 622-624(Nov 1978). Contract AS09-76EV00902.

A simple model is presented for a jet flowing along the continental margin of the South Atlantic Bight which provides a theoretical basis for observations of a quasi-permanent seaward deflection of the Gulf Stream near Charleston, South Carolina. (JMT)

32471 **Evidence for deflection of the Gulf Stream at the Charleston Rise.** Pietrafesa, L.J. (North Carolina State Univ., Raleigh); Blanton, J.O.; Atkinson, L.P. *Gulfstream;* 4: No. 4, 619-621(Sep 1978). Contract AS09-76EV00902.

Observational evidence is reported for a quasi-permanent deflection of the Gulf Stream along the continental margin of the South Atlantic Bight near Charleston, South Carolina. Results from hydrographic, nutrient and remote sensing data are included. (JMT)

5202 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 31091, 31100, 31101, 31210, 31232, 32426, 32429, 32431, 32437, 32438, 32455, 32610, 32632

32472 **(CONF-810292—) Papers of the 1st Neckar ecology symposium.** (Heidelberg Univ. (Germany, F.R.). Inst. fuer Sedimentforschung). 1981. 143p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901176.

From 1. Neckar ecology symposium; Heidelberg, F.R. Germany (16 Feb 1981).

The origins, the fate, and the ecological impact of pollutants have been investigated by the university institute in cooperation with the responsible ministry in the Land of Baden-Wuerttemberg. In particular, heavy metal concentrations in the sediments, concentrations of polycyclic aromatic hydrocarbons and phthalates in the sediments, heavy metals transfer from water and sediments into organisms, ecological and biological effects, and the degree of water pollution prevention in view of the role of the river as a source of service and reserve water have been gone into.

32473 **(CONF-8206180—1) Potential effects of energy development on trace element transport in major rivers.** Davis, M.J. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS MF A01. Order Number DE83010560.

From American Society of Civil Engineers conference on water and energy: technical and policy issues; Ft. Collins, CO, USA (27 Jun 1982).

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In the interval 1975 to 2000, energy-sector activities in the Ohio and Missouri River basins will contribute to those streams an amount of trace elements equivalent to only a few percent or less of the current river load of trace elements, even under worst-case conditions, if compliance with existing and proposed limits on aqueous and atmospheric emissions is assumed. Power plants, coal mines and preparation plants, and industrial fuel use are considered as sources of trace element emissions. Atmospheric deposition of trace elements released in coal combustion makes a negligible contribution to the energy-sector load, except possibly for mercury and zinc. The relative influence of the energy-sector contribution varies regionally; its influence in the Ohio basin is generally more important than in the Missouri basin, although it is small in both cases.

32474 **(ENEA-RT/CHI—82-9) Trace element determination in suspended particulate matter from natural waters by instrumental neutron activation analysis: evaluation of the method.** Boniforti, R.; Madaro, M.; Moauro, A. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Tecnologie Intersettoriali di Base). 1982. 25p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901786.

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This paper presents results obtained by measuring trace elements in particulate matter collected from natural waters (gulf of La Spezia, Vara and Magra rivers), using instrumental neutron activation analysis and γ-spectrometry. Precision and accuracy of the procedure and the detection limits in the experimental conditions used have been evaluated. 21 elements (As, Au, Ba, Ce, Co, Cr, Cs, Eu, Fe, Hf, Hg, La, Lu, Mn, Rb, Sb, Sc, Sm, Th, Yb, Zn) were determined. This work has shown that samples of natural waters taken at the same place consecutively can exhibit a very high variability in trace element content.

32475 **(GJO—113(83)) US Department of Energy Facilities - Grand Junction, Colorado, and Monticello, Utah: 1982 environmental monitoring report.** Korte, N.; Thul, R. (Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations). Apr 1983. Contract AC13-76GJ01664. 36p. NTIS, PC A03/MF A01. Order Number DE83012081.

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The shallow gravel aquifer underneath the Grand Junction, Colorado, Department of Energy facility is contaminated by uranium-mill tailings. According to Colorado water-quality standards, the aquifer is unfit for agricultural use - the lowest-use classification. This report describes 1982 monitoring activities and the location and levels of contamination. The contaminated aquifer's threat to the nearby Gunnison River system is probably negligible, but this cannot be verified without additional testing. Because there were no significant process changes and because no significant air-quality impacts were noted in previous years, no air-quality data were obtained in 1982. The shallow aquifer underneath the Monticello, Utah, property is also contaminated by uranium-mill tailings. The creek flowing through the property is contaminated at levels exceeding Utah water-quality standards for several miles downstream. This report describes a portion of a much larger environmental study currently underway at the site. Levels of water contamination and radon emission probably require mitigation to meet State of Utah and federal regulations.

32476 **(NUREG/CR—2965) Copper in the intake and discharge zones of the Surry and Salem Nuclear Power Stations.** Harrison, F.L.; Bishop, D.J.; Rice, D.W. Jr.; Knezovich, J.P. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 51p. (UCRL—53325). NTIS, PC A04/MF A01 - GPO. Order Number DE83011270.

Copper concentrations were measured in the soluble and particulate fractions of water samples and bedload sediments collected in intake and discharge areas of the Surry and Salem Nuclear Power Stations during normal operations. Additional samples of water and suspended particles were collected during startup of Unit 2 at the Salem Power Station. In water samples collected from Surry, total copper ranged from 6.5 to 24.7 and labile copper from 0.5 to 2.9 μg/L; in those from Salem, total copper ranged from 6.7 to 10.6 and labile from 0.9 to 3.8 μg/L. At both sites the highest total copper concentration was measured in January 1979 during a period of high runoff. In general, differences between influent and effluent waters were small; the maximum was 4.2 μg Cu/L. Copper concentration in the water during startup of Unit 2 of Salem was high initially (>2500 μg Cu/L) but was almost entirely in the particulate fraction; labile copper was only 0.6 μg/L. The apparent complexing capacity (ACC) of the waters from Surry ranged from 6 to 40 and those from Salem from 5 to 60 μg Cu/L. Ranges in dissolved organic carbon were smaller, 2.9 to 5.1 and 2.2 to 5.0 mg C/L for Surry and Salem, respectively, and showed no relationship with ACC. Ultrafiltration of discharge waters indicated that, in most samples, the largest fraction of copper in the untreated water was in the >10,000 <100,000 molecular weight fraction; in waters treated to destroy dissolved organic carbon, it was generally in the >100,000 molecular weight fraction.Copper concentrations in intact bedload sediments from the intake area of Surry ranged from 2.3 to 26 and of Salem from 36 to 74 μg/g dry weight; those in the discharge area of Surry ranged from 13 to 30 and of Salem from 3 to 67. We noted considerable spatial heterogeneity both at the intake and discharge areas, and higher copper concentrations in the <62-μm fraction than in intact sediments.

32477 **(PNL—4202) Aquatic-pathways model to predict the fate of phenolic compounds.** Aaberg, R.L.; Peloquin, R.A.; Strenge, D.L.; Mellinger, P.J. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 60p. NTIS, PC A04/MF A01. Order Number DE83011074.

Organic materials released from energy-related activities could affect human health and the environment. To better assess possible impacts, we developed a model to predict the fate of spills or discharges of pollutants into flowing or static bodies of fresh water. A computer code, Aquatic Pathways Model (APM), was written to implement the model. The computer programs use compartmental analysis to simulate aquatic ecosystems. The APM estimates the concentrations of chemicals in fish tissue, water and sediment, and is therefore useful for assessing exposure to humans through aquatic pathways. The APM will consider any aquatic pathway for which the user has transport data. Additionally, APM will estimate transport rates from physical and chemical properties of chemicals between several key compartments. The major pathways considered are biodegradation, fish and sediment uptake, photolysis, and evaporation. The model has been implemented with parameters for distribution of phenols, an important class of compounds found in the water-soluble fractions of coal liquids. Current modeling efforts show that, in comparison with many pesticides and polyaromatic hydrocarbons (PAH), the lighter phenolics (the cresols) are not persistent in the environment. The properties of heavier molecular weight phenolics (indanols, naphthols) are not well enough understood at this time to make similar judgements. For the twelve phenolics studied, biodegradation appears to be the major pathway for elimination from aquatic environments. A pond system simulation (using APM) of a spill of solvent refined coal (SRC-II) materials indicates that phenol, cresols, and other single cyclic phenolics are degraded to 16 to 25 percent of their original concentrations within 30 hours. Adsorption of these compounds into sediments and accumulation by fish was minor.

32478 **(RHO-HS-SR—82-10-4QP) Liquid waste discharged to ground in the 200 Areas through fourth quarter 1982: nonradiological parameters.** Meade, G.G. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). 4 Mar 1983. Contract AC06-77RL01030. 19p. NTIS, PC A02/MF A01. Order Number DE83011120.

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This document summarizes nonradiological-liquid discharge information from processing facilities in the 200 Areas of the Hanford site. Fourteen liquid effluent streams from nine facilities were sampled in 1982 for nonradiological parameters. The accumulated data were compared to limits in the Environmental Protection Agency Hazardous Waste Management Regulations (40 CFR 260 to 265) and industry guidelines using best practical technology (30-day average) control methods. Except for pH, liquid effluents were in compliance with industry discharge standards. The concentration of specified heavy metals has consistently been below Analytical Laboratories lower limit of detection. That limit has generally been

less than 25% of the allowable effluent concentration limit. The pH of the monthly composite samples from the various liquid effluents streams was outside the allowable range of 2 to 12.5 on one occasion, during which it was 1.8. Total organic carbon (TOC) concentration was generally below the lower limit of detection for eleven of the fourteen liquid effluent streams. Six monthly composite samples from the remaining three streams had TOC concentration greater than 50 mg/l. With one stream (LWC), elevated TOC is expected. The other two streams will be further scrutinized and specific analyses performed if warranted. Conductivity was elevated in four liquid streams.

32479 **(Y/DZ—65) Disposal of waste machining coolants in a biological reactor.** Taylor, P.A. (Oak Ridge Y-12 Plant, TN (USA)). 1983. Contract W-7405-ENG-26. 10p. (CONF-830540—1). NTIS, PC A02/MF A01. Order Number DE83011016.

From 1. international material removal conference; Detroit, MI, USA (3 May 1983).

The Oak Ridge Y-12 Plant uses approximately 10^6 L/y of water-based cutting fluids in its machining operations. The used coolants are disposed of in a 110,000-L activated-sludge reactor. The reactor oxidizes an average of 38.6 kg of organic carbon per day with an overall efficiency of 90%. The predominant bacteria in the reactor have been identified once each year for three years. Species from three genera, Pseudomonas, Microcyclus, and Seliberia, have accounted for 60% of the bacterial population. The latest bacterial identification used selective techniques to search for specific pathogens in the reactor. Several potential pathogens were identifed, but the concentration of each is low enough that the reactor solution is relatively innocuous.

32480 **Use of radioisotopes to study the transport of contaminants in a flood-plain environment.** Easey, J.F.; Airey, P.L.; Calf, G.E.; Davison, A. (Australian Atomic Energy Commission, Sutherland, NSW); Morely, A. (Pancontinental Mining Ltd., Sydney (Australia)). pp 451-452 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/2P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32481 **Pyrolysis mass spectrometry of some Scirpus species and their decomposition products.** Boon, J.J. (FOM-Inst. for Atomic and Molecular Physics, Kruislaan, The Netherlands); Wetzel, R.G.; Godshalk, G.L. *Limnology and Oceanography;* 27: No. 5, 839-848(1982). Contract AC02-76EV01599.

Four species of bulrushes (Scirpus acutus, Scirpus subterminalis, Scirpus validus, and Scirpus americanus) and the particulate decompositon products of S. acutus and S. subterminalis were analyzed by Curie-point pyrolysis low-voltage ionization mass spectrometry. The mass pyrograms of the emergent foliage of the fresh plants showed similarity in distribution of the pyrolsis products from polysaccharides, lignin, and protein. Mass peak m/z 120 differed markedly in relative abundance in these plants and was identified by pyrolysis gas-chromatogrphy MS as parahydroxystyrene, a pyrolysis product of paracoumaric esters. Decomposition was carried out in the laboratory under aerobic and anaerobic conditions at 10° and 25°C for 180 days. The mass spectra of the senescent S. acutus differed only slightly from the decomposition stages after 180 days at 25°C, but the mass spectra of decomposed senescent submersed foliage of S. subterminalis showed a reduction in pyrolysis products of neutral polysaccharides and an increase in products from proteins and bacterial amino sugar polymers especially after anaerobic decomposition. Large amounts of paracoumaric esters and lignin derivatives were found in all species. These compounds were resistant to degradation, suggesting that paracoumaric esters can influence the slow decay of emergent plants in the littoral zone of lakes.

5203 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 31292, 32426, 32428, 32429, 32430, 32431, 32436, 32437, 32438, 32445, 32446, 32450, 32454, 32455, 32462, 32463, 32475, 32630

32482 **(CONF-8110126—13) Plutonium - its behavior in natural-water systems and assimilation by man.** Larsen, R.P.; Nelson, D.M.; Bhattacharyya, M.H.; Oldham, R.D. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83010556.

From International meeting on the radiobiology of radium and actinides in man; Lake Geneva, WI, USA (12 Oct 1981).

There are a number of factors which must be considered in establishing whether or not the inadvertent intrusion of a sizable amount of plutonium-bearing material into a natural-water system may have a significant impact on the health of those individuals who use that system as a drinking-water resource. These factors include the chemical form(s) and solubility of plutonium in natural waters, its behavior in relation to natural processes (geochemical and biological), its fate in water-treatment systems, and its uptake by man from drinking water. From the results obtained of the behavior in natural-water systems, it appears that (1) the chemical forms of plutonium dissolved in natural waters are Pu(IV) and Pu(V), (2) the soluble plutonium in many waters is bound to the organic constituents which probably enhance plutonium solubility, (3) the natural process responsible for the removal of plutonium from water is adsorption onto sediments, and (4) in water-treatment systems, soluble plutonium is oxidized to the VI state and this form is not removed. From investigations of gastrointestinal absorption, it appears that the value for f_1, the fraction transferred from the gut to blood, is greater than 1×10^{-3} and may be as high as 2×10^{-1}.

32483 **(DOE/EV/70030—11) Cycling of transuranic radionuclides in the Columbia River, its estuary and the northeast Pacific Ocean. Progress report, January-December 1982.** Beasley, T.M. (Oregon State Univ., Newport (USA). Marine Science Center). 1982. Contract AT06-76EV70030. 12p. NTIS, PC A02/MF A01. Order Number DE83011466.

This report summarizes progress from 1 January 1982 through 31 December 1982 in research on the behavior of transuranic and other radionuclides in the Columbia River downstream from the Hanford Reservation and in the northeast Pacific Ocean.

32484 (INIS-mf—7550, pp vp) **Selection of suitable measuring techniques for assessment of radionuclides in water.** Unfried, E.; Tschurlovits, M. (Atominstitut der Oesterreichischen Universitaeten, Vienna). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32485 (INIS-mf—7550, pp vp) **Standard methods for the determination of low-level activities in aqueous media used in water laboratories.** Mansfeld, A.; Hanslik, E. (Vyzkumny Ustav Vodohospodarsky, Prague (Czechoslovakia)). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32486 (INIS-mf—7550, pp vp) **Determination of ^{226}Ra in water by the liquid scintillation counting.** Burcik, I. (Ustav Radioekologie a Vyuzitia Jadrovej Techniky, Kosice (Czechoslovakia)). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32487 (INIS-mf—7550, pp vp) **Gamma-spectrometric investigation of marine sediments, water and algae at the Black seaside.** Kolarova, M. (Bylgarska Akademiya na Naukite, Sofia. Inst. po Khidrologiya i Meteorologiya); Dimchev, T. (Bylgarska Akademiya na Naukite, Sofia. Inst. za Yadrena Izsledvaniya i Yadrena Energetika). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32488 (NUREG/CR—3136) **Aquifer restoration at in-situ leach uranium mines: evidence for natural restoration processes.** Deutsch, W.J.; Serne, R.J.; Bell, N.E.; Martin, W.J. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1983. Contract AC06-76RL01830. 95p. (PNL—4604). NTIS, PC A05/MF A01 - GPO $5.50. Order Number DE83012477.

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Pacific Northwest Laboratory conducted experiments with aquifer sediments and leaching solution (lixiviant) from an in-situ leach uranium mine. The data from these laboratory experiments and information on the normal distribution of elements associated with roll-front uranium deposits provide evidence that natural processes can enhance restoration of aquifers affected by leach mining. Our experiments show that the concentration of uranium (U) in solution can decrease at least an order of magnitude (from 50 to less than 5 ppM U) due to reactions between the lixiviant and sediment, and that a uranium solid, possibly amorphous uranium dioxide, (UO_2), can limit the concentration of uranium in a solution in contact with reduced sediment. The concentrations of As, Se, and Mo in an oxidizing lixiviant should also decrease as a result of redox and precipitation reactions between the solution and sediment. The lixiviant concentrations of major anions (chloride and sulfate) other than carbonate were not affected by short-term (less than one week) contact with the aquifer sediments. This is also true of the total dissolved solids level of the solution. Consequently, we recommend that these solution parameters be used as indicators of an excursion of leaching solution from the leach field. Our experiments have shown that natural aquifer processes can affect the solution concentration of certain constituents. This effect should be considered when guidelines for aquifer restoration are established.

5204 Thermal Effluents Monitoring And Transport

REFER ALSO TO CITATION(S) 31376, 31600

5205 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 31178, 31294, 31299

32489 (DOE/EV/04076—9) **Nontechnical summary of research, January 1978-March 1983.** Powers, K.D. (Manomet Bird Observatory, MA (USA)). Apr 1983. Contract AC02-78EV04706. 11p. NTIS, PC A02/MF A01. Order Number DE83011595.

The objectives were three-fold: (1) describe the distribution and abundance of marine birds on Georges Bank and its adjacent waters, using a ships-of-opportunity program, (2) develop a computerized marine bird data bank, and (3) examine the feeding habits of the most common bird species in the area. In 1979 we expanded the study area to include all shelf waters from Cape Hatteras to Nova Scotia and we examined the possibility of using opportunistically available US Coast Guard offshore flights as an additional survey platform. The justification of the marine bird survey on Georges Bank was to assess distribution and abundance prior to development of these offshore areas for oil and natural gas exploration and extraction. There were no historical accounts of bird distribution for these offshore areas and this study was to provide the baseline understanding by which subsequent change could be measured. The species considered as marine birds were from the following families: loons, tubenoses (fulmars, shearwaters and storm-petrels), pelecaniforms (cormorants and gannets), stercoracids (Jaegers and skuas), phalaropes, gulls, terns and alcids (razorbill, murres, dovekie, puffin).

5206 Regulations

32490 (DOE/MA—0064/1) **Energy and water development appropriations for 1984. Part 4. Department of Energy FY 1984 budget justifications. Hearings before the Subcommittee on Energy and Water Development, Committee on Appropriations, House of Representatives, Ninety-Eighth Congress, First Session.** (USDOE, Washington, DC). 1983. 1616p. NTIS, PC A99/MF A01. Order Number DE83011554.

Text of the hearings is presented covering budget highlights; atomic energy defense activities; energy supply, research and development, general science and research; uranium enrichment; geothermal resources development fund; power marketing administration; departmental administration; and the Federal Energy Regulatory Commission. (PSB)

53 ENVIRONMENTAL-SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

5301 Social And Economic Studies

REFER ALSO TO CITATION(S) 31821, 31822, 31824, 31863, 31865

32491 (AECL—6817) **Society's general exposure to risk.** Lidstone, R.F. (Atomic Energy of Canada Ltd., Pinawa, Manitoba. Whiteshell Nuclear Research Establishment). Oct 1981. 34p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700320.

Canadian and world experience with accidents and disease is reviewed in order to identify risk information that might extend the societal perspective on health risk beyond daily concerns. The level of exposure to catastrophic risks is compared to that associated with commonly experienced risks. An examination of current and historical levels of Canadian mortality risk is included. The association between mortality risk and Canadian industrial activity is also examined. Some prospects for utilizing these risk benchmarks are then discussed.

5302 Assessment Of Energy Technologies

REFER ALSO TO CITATION(S) 31155, 31828

5303 Environmental Impact Statements

32492 (FERC/EIS—0032) **Cowlitz Falls Project FERC No. 2833-Washington. Final Environmental Impact Statement.** (Federal Energy Regulatory Commission, Washington, DC (USA). Office of Electric Power Regulation). Apr 1983. 251p. NTIS, PC A12/MF A01. Order Number DE83011544.

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The Public Utility District No. 1 of Lewis County (the Applicant or the District) proposes to construct and operate a hydroelectric project with an installed capacity of 70 MW at Cowlitz Falls, on the Cowlitz River near the towns of Morton and Randle, Washington. The proposed project would inundate 12.3 miles of the Cowlitz River and 1.7 miles of the Cispus River, and would consist of: (1) a concrete-gravity dam at River Mile (RM) 88.6, extending 140 feet above the streambed, with a 15-foot-wide, 800-foot-long crest, and containing an ogee spillway overflow section with four radial gates; (2) a power intake structure integral with a non-overflow section of the dam; (3) a reservoir at elevation 866 feet mean sea level (EL 866), covering 870 acres, with a total volume of 13,150 acre-feet; (4) an indoor powerhouse integrated with the dam and intake; (5) a switchyard located about 500 feet downstream from the powerhouse; (6) a tailrace and modified channel, extending approximately 1 mile downstream from the powerhouse; (7) a 115-kV transmission line, extending approximately 5.2 miles to a new substation at Glenoma; and (8) appurtenant facilities. This report analyzes several alternatives to the proposed project,

including alternative project designs, a woodwaste facility, a coal-fired plant, and no-action.

55 BIOMEDICAL SCIENCES, BASIC STUDIES

5502 Biochemistry

REFER ALSO TO CITATION(S) 32121, 32135, 32602, 32603

32493 **(DOE/ER/04310—T1) Primary light-harvesting system: phycobilisomes and associated membranes. Progress report, December 1979-January 1983.** Gantt, E. (Smithsonian Institution, Rockville, MD (USA). Radiation Biology Lab.). 1983. Contract AS05-76ER04310. 7p. NTIS, PC A02/MF A01. Order Number DE83011070.

The structure of phycobilisomes, which serve as primary light-harvesting complexes for photosynthesis, were investigated in red and blue-green algae (cyanobacteria). Structurally the phycobilisomes have the same fundamental arrangement in the various species, with allophycocyanin being in the core from which peripheral rods composed of phycocyanin or phycocyanin-phycoerythyrin radiate. Such studies were extended to show that energetically functional phycobilisomes could be formed in vitro from separated fractions of allophycocyanin and phycoerythrin-phycocyanin within the same species (Nostoc) and between separate species (Fremyella and Nostoc). A large (95 kD) blue-colored polypeptide is being regarded as an anchor component between phycobilisomes and thylakoids. The polypeptide, isolated from phycobilisomes, had two long wavelength-emitting types of chromophores, one similar to allophycocyanin and another to chlorophyll. Such a large (95 kD) polypeptide occurred in phycobilisomes of red and blue-green algae examined, with the exception of Anacystis where it was somewhat smaller (75 kD). The effect of light quality on phycobilisome structure varied among the blue-green species studied. The relationship of the photosystems and phycobilisomes was investigated in Anacystis wild type cells, and in mutants deficient in phycocyanin. Although the phycocyanin and chlorophyll content per cell changed with light quality the phycobilisome per Reaction Center 2 ratio remained at ca. 0.9 +- 0.3 suggesting that only the size of the antennae varied.

32494 **(DOE/ER/12003—T1) Investigation of the nature of semisynthetic esterases. Interim progress report, September 15, 1982-April 15, 1983.** Keyes, M.H. (Owens-Illinois, Inc., Toledo, OH (USA)). Apr 1983. Contract AC02-81ER12003. 21p. NTIS, PC A02/MF A01. Order Number DE83011433.

Two semisynthetic esterases, an acid esterase with pH optimum of 6.0 and a neutral esterase with pH optimum of 7.5, were generated from bovine pancreatic ribonuclease. The method of generation involves the perturbation of protein structure at pH 3.0, subsequent conformational modification with indole propionic acid, and crosslinking the modified protein with glutaraldehyde. The acid esterase possesses broad specificity, hydrolyzing tyrosine ethyl ester and benzoylarginine ethyl ester, as well as tryptophan ethyl ester (TrEE). The neutal esterase was more specific towards TrEE having much lower activity towards the other measured substrates. Moreover, the acid esterase was inhibited by 1 mM tryptophan whereas the neutral esterase was not. The esterases were further tested for amidase activity. The neutral esterase had significant amidase activity toward N-acetyltryptophanamide (NATA), but did not hydrolyze benzoylarginine-p-nitroanilide (BAPNA). The acid esterase was most active towards BAPNA, but did possess a very low activity towards NATA. The two esterases have been separated by means of ammonium sulfate fractionation. The neutral esterase was precipitated at 40% ammonium sulfate saturation, while the acid esterase was precipitated between 70 to 80% saturation. The two fractions were further purified by means of gel filtration on Sephadex G-75. Overall purification of nearly ten-fold was achieved by the two steps.

32495 **(DOE/ER/12003—T2) Investigation of the nature of semisynthetic esterases. Annual progress report, September 15, 1981-September 14, 1982.** Keyes, M.H. (Owens-Illinois, Inc., Toledo, OH (USA)). Nov 1982. Contract AC02-81ER12003. 15p. NTIS, PC A02/MF A01. Order Number DE83012072.

Esterase activities were generated from partially denatured bovine pancreatic ribonuclease by means of conformational modification induced by known esterase-inhibitors, and by crosslinking the modified protein. A spectrophotometric method was developed to assay the emisynthetic esterases generated by the above procedure. The method consisted of using L-tryptophan ethyl ester (TrEE) as substrate and measuring the ethanol produced with the alcohol dehydrogenase-NAD system. While indole, indole acetic acid, as well as indole propionic acid were used as modifiers to generate esterase activities, the highest esterase activity was produced with indole propionic acid. Kinetic studies indicated that the modified RNase preparations contained two esterases - an acid esterase with an optimal pH of 6.0 and a neutral esterase with an optimal pH of 7.5. These esterases possessed different substrate specificity, product inhibition and substrate affinities. Neutral esterase was more specific towards TrEE while acid esterase hydrolyzed BAEE tyrosine ethyl ester (TEE), and TrEE equally well. L-tryptophan inhibited the acid esterase activity, but did not have any effect on the activity of neutral esterase.

32496 **Stability and in vitro DNA packaging of bacteriophages: effects of dextrans, sugars, and polyols.** Serwer, P. (The Univ. of Texas Health Science Center, San Antonio); Masker, W.E.; Allen, J.L. *Journal of Virology;* **45**: No. 2, 665-671(Feb 1983). Contract W-7405-ENG-26.

Attempts were made to increase the efficiency of infectious particle formation during the in vitro assembly of bacteriophage T7 from procapsids and DNA. It was found that dextrans and some smaller, related compounds (sucrose and sorbitol) increase this efficiency by a factor of 8 to 50. Dextrans also inhibited elevated temperature-induced emptying of DNA from bacteriophages T7, P22, and T4, suggesting that the stimulation of assembly is caused, at least in part, by the stabilization of packaged DNA in capsids. The data indicated that the sugars and polyols can slow DNA emptying from bacteriophages at elevated temperature whether they permeate the bacteriophage capsid or not. In contrast, the data suggested that permeation of some particle, probably a capsid, results in inhibition of in vitro T7 assembly.

32497 **RNA turnover in cultured hamster embryo cells: identification of modified nucleoside end products.** Lothrop, C.D. Jr. (Univ. of Tennessee-Oak Ridge Graduate School of Biomedical Sciences); Uziel, M. *Journal of Cellular Physiology;* **114**: No. 1, 111-116(Jan 1983). Contract W-7405-ENG-26.

Fourteen methylated nucleosides (N-2-dimethylGuo, N-2-methylGuo, N-1-methylGuo, N-5-methylUrd, N-3-methylUrd, N-1-methylAdo, N-3-methylCyd, N-5-methylCyd, N-1-methylIno, 2'-0-methyl-Cyd, 2'-0-methylUrd, 2'-0-methylGuo, 2'-0-methylino, and thymidine) and one methylated base (m^7Gua) have been identified as normal excretion products of cultured hamster embryo cells. The methylated nucleosides are excreted in the culture media subsequent to RNA turnover. The excretion pattern of the base-methylated nucleosides was determined by continuous labeling of serum-stimulated quiescent hamster embryo cells with [^{3}H-CH_3]methionine and measurement of radioactivity in the excreted nucleosides between 23 and 81 1/2 hours after the label was added. These nucleosides accumulate exponentially until a maximum level is reached after 60 hours. These maximum levels were maintained for at least an additional 20 hours.

32498 **Differential uptake of liposomes varying in size and lipid composition by parenchymal and Kupffer cells of mouse liver.** Rahman, Y.E.; Cerny, E.A.; Patel, K.R.; Lau, E.H.; Wright, B.J. *Life Sciences;* **31**: No. 19, 2061-2071(8 Nov 1982). Contract W-31-109-ENG-38.

Using liposomes differing in size and lipid composition, we have studied the uptake characteristics of the liver parenchymal and Kupffer cells. Desferal labeled with iron-59 was chosen as a ra-

diomarker for the liposomal content, because Desferal in its free form does not cross cellular membranes.At various time intervals after an intravenous injection of liposomes into mice, the liver was perfused with collagenase, and the cells were separated in a Percoll gradient. It was found that large multilamellar liposomes (diameter of about 0.5 μm) were mainly taken up by the Kupffer cells. For these large liposomes, the rate of uptake by Kupffer cells was rapid, with maximum uptake at around 2 hours after liposme injection. Unexpectedly, small unilamellar liposomes (diameter of about 0.08 μm) were less effectively taken up by Kupffer cells, and the rate of uptake was slow, with a maximum uptake at about 10 hours after liposome injection. In contrast, parenchymal cells were more effective in taking up small liposmes and the uptake of large liposomes was negligible. In addition, liposomes made with a galactolipid as part of the lipid constituents appeared to have higher affinity to parenchymal cells than liposomes made without the galactolipid. These findings should be of importance in designing suitable liposomes for drug targeting.

32499 **Kinetics for exchange of imino protons in deoxyribonucleic acid, ribonucleic acid, and hybrid oligonucleotide helices.** Pardi, A.; Tinoco, I. Jr. (Univ. of California, Berkeley). *Biochemistry;* **21**: No. 19, 4686-4693(14 Sep 1982). Contract AC03-76SF00098.

The lifetimes for opening of individual base pairs in a DNA ($dCA_5G + dCT_5G$), an RNA ($rCA_5G + rCU_5G$), and a hybrid DNA-RNA ($rCA_5G + dCT_5G$) helix have been measured by proton nuclear magnetic resonance. The lifetimes were obtained by saturation recovery experiments performed on the hydrogen-bonding imino protons of the Watson-Crick base pairs. In these oligonucleotide helices the observed relaxation rates were dominated by exchange with water, with the magnetic spin-lattice relaxation time of the imino protons possibly being important only at the lowest temperatures in the DNA helix. It was shown that three interior base pairs in the DNA heptamer $dCA_5G + dCT_5G$ were in the open-limited region, which means that these imino protons exchange every time the base pair opens. The lifetimes of the terminal G-C base pairs in the DNA helix are much shorter than the interior A-T base pairs. The pH dependence of the terminal base pairs indicated that the ends of the helix open and close many times before exchange of the imino protons with water takes place. The temperature dependence of the lifetimes of the interior A-T imino protons in the DNA helix showed that these protons exchange only when the double helix was dissociated into single strands. Thus, these lifetimes measure the rate for dissociation of the double helix. The activation energy for this process was found to be 47 kcal/mol. Comparison of the lifetimes of the interior protons in the DNA, RNA, and hybrid helices showed that the rates of dissociation of the RNA and hybrid helices are very similar at 5° C, whereas the rate for the DNA helix was approximately 1 order of magnitude smaller than that for the other two helices.

32500 **Molecular morphology of cyanobacterial phycobilisomes.** Siegelman, H.W.; Kycia, J.H. (Brookhaven National Lab., Upton, NY). *Plant Physiology;* **70**: No. 3, 887(Sep 1982).

Phycobilisomes were isolated from several cyanobacteria following cell lysis with Triton X-100. They were purified by phosphate precipitation and hydrophobic-interaction chromatography. Their phycobiliprotein compositions were quantitatively determined by application of sets of simultaneous absorbance equations to gel chromatographic separations of the chromoproteins. Phycobilisomes purified from several cyanobacteria had characteristic elution times on agarose gel chromatography. Combining electron microscope observations of phycobilisome structure, phycobiliprotein composition, and agarose gel chromatography estimates of molecular weight permitted the calculation of many details of phycobilisome molecular structure. Complementary chromatic adaptation resulted in a change of phycobilisome composition and structure. The polypeptide compositions of phycobilisomes were examined by sodium dodecyl sulfate-agarose gel chromatography and sodium dodecyl sulfate-polyacrylamide gel electrophoresis. The phycobilisomes were composed of phycobilipeptides derived from the constituent phycobiliproteins. Higher molecular-weight phycobilipeptide aggregates were also observed. The dominant forces responsible for the maintenance of phycobilisome structure are concluded to be hydropohobic interactions.

32501 **Free radicals and tissue damage produced by exercise.** Davies, K.J.A. (Univ. of California, Berkeley); Quintanilha, A.T.; Brooks, G.A.; Packer, L. *Biochemical and Biophysical Research Communications;* **107**: No. 4, 1198-1205(31 Aug 1982).

We report a two- to three-fold increase in free radical ($R^\bullet$) concentrations of muscle and liver following exercise to exhaustive. Exhaustive exercise also resulted in decreased mitochondrial respiratory control, loss of sarcoplasmic reticulum (SR) and endoplasmic reticulum (ER) integrity, and increased levels of lipid peroxidation products. Free radical concentrations, lipid peroxidation, mitochondrial and SR, ER, and mitochondrial damage were similar in exercise exhausted control animals and non-exercised vitamin E deficient animals, suggesting the possibility of a common $R^\bullet$ dependent damage process. In agreement with previous work showing that exercise endurance capacity is largely determined by the functional mitochondrial content of muscle (1-4), vitamin E deficient animals endurance was 40% lower than that of controls. The results suggest that $R^\bullet$ induced damage may provide a stimulus to the mitochondrial biogenesis which results from endurance training.

32502 **A new mechanism for the terminal stages of complement hemolysis based on kinetic and thermodynamic rationales.** Wirtz, G.H.; Canady, W.J. (West Virginia Univ. Medical Center, Morgantown). *Biochemical and Biophysical Research Communications;* **107**: No. 3, 1110-1116(16 Aug 1982).

Okada, Boyle and Borsos made a study of the temperature dependence of and effects of preincubation on the terminal reactions in complement hemolysis. They suggested that EAC1-9/sup inserted/ could go on to lysis by either of two reaction paths and also that there is an enzyme catalyzed step. In this paper we show by kinetic and thermodynamic analysis a) that their results are inconsistent with such a double path mechanism and b) that their data are quantitatively compatible with a fairly conventional Michaelis-Menten mechanism. Although we agree with Okada et. al that their data are consistant with the participation of an enzyme in the terminal stages of complement hemolysis, the type of rate laws referred to in this paper could apply to some non-enzymatic reactions.

32503 **Biosynthesis, nonenzymatic synthesis, and purification of the intermediate in synthesis of sepiapterin in drosophila.** Dorsett, D.; Flanagan, J.M.; Jacobson, K.B. (Oak Ridge National Lab., TN). *Biochemistry;* **21**: No. 16, 3892-3899(3 Aug 1982). Contract W-7405-ENG-26.

The enzymatic conversion of the D-erythro-dihydroneopterin triphosphate [H_2-neopterin-$(P)_3$] to sepiapterin occurs via a nonphosphorylated intermediate as shown by others. We have developed a high-performance liquid chromatography assay for this intermediate and have found that the intermediate (X) and two related compounds (X1 and X2) can be formed nonenzymatically under certain conditions from H_2-neopterin-$(P)_3$. The reaction is catalyzed by tris(hydroxymethyl)aminomethane, dependent upon H_2-neopterin-$(P)_3$ concentration, significant at temperatures greater than 80°C, and maximal between pH 8.5 and 9.5 (as determined at 25°C). All three compounds were purified, and it was found that both X and X1 can serve as substrates for the enzymatic, NADPH-dependent synthesis of sepiapterin. From the kinetics of formation from H_2-neopterin-$(P)_3$ and the similarity of the ultraviolet spectra, it is clear that X,X1, and X2 are closely related compounds. None of the three compounds is reduced by $NaBH_4$; only X1 is sensitive to periodate oxidation. All three can be oxidized with iodine to give rise to highly fluorescent compounds that in turn can be reduced by $NaBH_4$ to give rise to the respective parent compounds. These latter observations indicate that X, X1, and X2 are dihydropterins. These results are discussed relative to the proposed structures for enzymatically produced X. The methods described for the nonenzymatic synthesis of X and its purification should allow preparation of large amounts of X for future study.

32504 A yeast endoribonuclease stimulated by Novikoff hepatoma small nuclear RNAs U1 and U2. Stevens, A. (Oak Ridge National Lab., TN). *Biochemical and Biophysical Research Communications;* **107**: No. 2, 642-648(30 Jul 1982). Contract W-7405-ENG-26.

Using [^{3}H]m^{7}Gppp[^{14}C]RNA-poly(A) from yeast as a substrate, an endoribonuclease has been detected in enzyme fractions derived from a high salt wash of ribonucleoprotein particles of Saccharomyces cerevisiae. The [^{3}H]m^{7}Gppp[^{14}C]RNA-poly(A) seems to be a preferred substrate since other polyribonucleotides are hydrolyzed more slowly, if at all. The enzyme is inhibited by ethidium bromide, but fully double-stranded polyribonucleotides are not hydrolyzed. The hydrolysis of [^{3}H]m^{7}Gppp[^{14}C]RNA-poly(A) is stimulated about 2.5-fold by the addition of small nuclear RNAs U1 and U2 of Novikoff hepatoma cells. Results show that the stimulation involves an interaction of the labeled RNA with the small nuclear RNA.

32505 Dimethylnitrosamine demethylase activity in Drosophila melanogaster. Waters, L.C.; Nix, C.E.; Epler, J.L. *Biochemical and Biophysical Research Communications;* **106**: No. 3, 779-785(15 Jun 1982). Contract W-7405-ENG-26.

A dimethylnitrosamine (DMN) demethylase with levels of activity comparable to that in uninduced rat liver was demonstrated in both larval and adult forms of the Hikone-R strain of Drosophila. A microsomal enzyme, it has many properties of a cytochrome P-450-containing mixed-function oxidase. Kinetic analysis indicates only a single enzyme with an apparent K/sub m/ of 10.5 mM DMN.

32506 Phosphorylation of terminal deoxynucleotidyl transferase in leukemic cells. Elias, L. (Univ. of New Mexico School of Medicine, Albuquerque); Longmire, J.; Wood, A.; Ratliff, R. *Biochemical and Biophysical Research Communications;* **106**: No. 2, 458-465(31 May 1982).

Phosphorylation of terminal deoxynucleotidyl transferase within leukemic cells has been demonstrated, using ^{32}P labelling of intact cells in culture, followed by immunoprecipitation of the cellular extracts using an anti-terminal transferase antiserum. The phosphate linkage was found to involve serine and threonine residues. Purified calf thymus terminal transferase served as a substrate for cyclic AMP independent protein kinase obtained from leukemic cells. Phosphorylation in vitro of terminal transferase was accompanied by increased activity and decreased inhibition by excess ribo-ATP. These results indicate that terminal transferase is a physiologic cyclic AMP independent protein kinase substrate, and that this reaction may be important in its control.

32507 Activities of enzymes that metabolize platelet-activating factor (1-alkyl-2-acetyl-sn-glycero-3-phosphocholine) in neutrophils and eosinophils from humans and the effect of a calcium ionophore. Lee, T. (Oak Ridge Associated Univ., TN); Malone, B.; Wasserman, S.I.; Fitzgerald, V.; Snyder, F. *Biochemical and Biophysical Research Communications;* **105**: No. 4, 1303-1308(29 Apr 1982). Contract AC05-76OR00033.

Enzymatic systems in human blood cells are described for the activation and inactivation of a biologically active phospholipid (1-alkyl-2-acetyl-sn-glycero-3-phosphocholine) with hypotensive, platelet-aggregating, and inflammatory properties. The results document the presence of alkyldihydroxyacetone-phosphate synthase (forms the O-alkyl linkage in lipids), 1-alkyl-2-lyso-sn-glycero-3-phosphocholine:acetyl-CoA acetyltransferase (produces the biologically active molecule), and 1-alkyl-sn-glycero-3-phosphocholine: acetylhydrolase (destroys the biological activity) in human neutrophils and eosinophils. Both the acetyltransferase and acetylhydrolase activities are increased severalfold after treatment of normal neutrophils with ionophore A23187; however, alkyldihydroxyacetone-phosphate synthase activity is not influenced by the ionophore. Eosinophils isolated from patients with eosinophilia have significantly greater activities of all the enzymes studied than the eosinophils isolated from normal individuals. Our results indicate the acetyltransferase responsible for 1-alkyl-2-acetyl-sn-glycero-3-phosphocholine synthesis may serve an important role in human blood cells that release this biologically active phospholipid. Moreover, the acetyltransferase activity was found to be dramatically influenced by calcium flux.

32508 Quantifaction of mutagens at the Na^+-K^+-ATPase and hypoxanthine-guanine phosphoribosyl transferase (HGPRT) gene loci in Chinese hamster ovary cells. Li, A.P. (Lovelace Inhalation Toxicology Research Inst., Albuquerque, NM). *Journal of Tissue Culture Methods;* **7**: No. 1, 27-32(1982).

The Chinese hamster ovary (CHO) cell/hypoxanthine guanine phosphoribosyl transferase (HGPRT) mutagen assay developed by Hsie et al., was simplified by culturing the cells as unattached cultures, and also modified to include mutation at the Na^+-K^+ ATPase (ouabain resistance) gene locus. The cost and time involved were decreased by culturing the CHO cells unattached on nontissue culture plates during the expression period. The inclusion of a second gene locus ensures that mutagenicities observed were not due to the peculiar properties of a specific gene locus. These procedures are now used in our laboratory for routine testing of environmental chemicals and complex mixtures.

32509 Deoxyribonucleic acid-protein and deoxyribonucleic acid interstrand cross-links induced in isolated chromatin by hydrogen peroxide and ferrous ethylenediaminetetraacetate chelates. Lesko, S.A.; Drocourt, J.; Yang, S. (John Hopkins Univ., Baltimore, MD). *Biochemistry;* **21**: 5010-5015(1982). Contract AC02-76EV03280.

DNA-protein and DNA interstrand cross-links were induced in isolated chromatin after treatment with H_2O_2 and ferrous ethylenediaminetetraacetate (EDTA). Retention of DNA on membrane filters after heating of chromatin in a dissociating solvent indicated the presence of a stable linkage between DNA and protein. Treatment of protein-free DNA with H_2O_2/Fe^{2+}-EDTA did not result in enhanced filter retention. Incubation of cross-linked chromatin with proteinase K completely eliminated filter retention. Resistance to S_1 nuclease after a denaturation-renaturation cycle was used to detect DNA interstrand cross-links. Heating the treated chromatin at 45°C for 16 h and $NaBH_4$ reduction enhanced the extent of interstrand cross-linking. The following data are consistent with, but do not totally prove, the hypothesis that cross-links are induced by hydroxyl radicals generated in Fenton-type reactions: (1) cross-linking was inhibited by hydroxyl radical scavengers; (2) the degree of inhibition of DNA interstrand cross-links correlated very closely with the rate constants of the scavengers for reaction with hydroxyl radicals; (3) cross-linking was eliminated or greatly reduced by catalase; (4) the extent of cross-linking was directly related to the concentration of Fe^{2+}-EDTA. Partial inhibition of cross-linking by superoxide dismutase indicates that super-oxide-driven Fenton chemistry is involved. The data indicate that DNA cross-linking may play a role in the manifestation of the biological activity of agents of systems that generate reactive hydroxyl radicals.

32510 Photoreactivating enzyme from Escherichia coli: isolated enzyme lacks absorption in its actinic wavelength region and its ribonucleic acid cofactor is partially double stranded when associated with apoprotein. Cimino, G.D. (Brookhaven National Lab., Upton, NY); Sutherland, J.C. *Biochemistry;* **21**: 3914-3921(1982).

Isolated photoreactivating enzyme (PRE) from Escherichia coli exhibits some optical density at wavelengths greater than 300 nm. After correcting for the effects of light scattering, however, we find no true absorption in the spectral region that is required for enzymatic activity (320-450 nm). At shorter wavelengths, there is an absorption maximum near 260 nm that is due primarily to an RNA cofactor. Heating to 60° C and subsequently cooling to 4° C released the RNA cofactor from association with apoprotein and result in hyperchromicity. Circular dichroism indicates that the RNA associated with native enzyme is partially double stranded. At low ionic strength (μ = 0.01), heating to 15° C or protease treatment at 4° C results in irreversible loss of part of the double strandedness. We show that the difference spectrum at 4° C between the absorption spectra of native enzyme and heat-treated enzyme can be fit by a superposition of reference spectra for denaturation of A-U and G-C base pairs derived from model polynucleotides. The coefficients of the linear combination of reference spectra were used to calculate the fraction of A-U and G-C base pairs. We find that both A-U and G-C base pairs are present in

equal concentrations and that about 20% are in a double-standard conformation in the native enzyme.

32511 **Benzo(a)pyrene-binding proteins of hamster embryo cell nuclei: comparison of nuclear isolation procedures.** MacLeod, M.C.; Mansfield, B.K.; Selkirk, J.K. (Oak Ridge National Lab., TN). *Journal of Cellular Biochemistry;* 18: 507-513(1982). Contract W-7405-ENG-26.

Hamster embryo cells matabolize benzo(a)pyrene to derivatives that covalently modify nuclear macromolecules including proteins. Not all proteins are modified to the same extent nor by the same metabolites. In particular, a protein of apparent molecular weight 32,000 is highly modified by derivatives of trans-9,10-dihydro-9,10-dihydroxy B(a)P. This protein is shown here to be preferentially lost from nuclei during purification by centrifugation through high molarity sucrose solutions followed by osmotic shock. It does not appear to be a cytoplasmic contaminant, but shares many properties of an abundant protein from Xenopus laevis oocytes, nucleoplasmin.

32512 **Time-related changes in the synthesis and secretion of very low density, low density and high density lipoproteins by cultured rat hepatocytes.** Bell-Quint, J.; Forte, T. (Lawrence Berkeley Lab., CA). *Biochimica et Biophysica Acta;* 663: 83-98(1981).

Lipoproteins in the three major density classes were isolated from the medium of cultured rat hepatocytes incubated in the absence of serum for periods ranging from 1 to 48 h. De novo synthesis was suggested by the cyclo-heximide-sensitive incorporation of [^{3}H]leucine into the apolipoproteins of the secreted lipoproteins. Exogenous sodium oleate resulted in a concentration-dependent stimulation of VLDL synthesis at longer incubation periods.The triacylglycerol content of the secreted LDL fraction was also significantly increased following sodium oleate addition and there was an increased number of 425-650 angstroms particles present, which may represent catabolic products of VLDL. Hepatocyte monolayers which can be maintained in serum-free media for extended periods should be useful for studying regulation of hepatic metabolism of the three major lipoprotein classes. (JMT)

32513 **"Compression" of retinal responsivity: V-log I functions and increment thresholds.** Williams, T.P.; Gale, J.G. (Florida State Univ., Tallahassee). *Vision Research;* 18: 587-590(1978).

A model is given which is based on the idea that a retinal response-producing system can only exist in one of two states. The two-state nature of the model leads directly to simple compression adaptation as in human rod signals. It is suggested that it is applicable to two non-neural responses of the retina, c-wave (from pigment epithelial cells) and slow PIII (from glial cells) since these responses have certain saturation properties which characterize compression systems. (RAF)

32514 **Flash photolysis of visual pigments in solution--II. The effect of preparation on the observed kinetics.** Bargoot, F.G.; Williams, T.P. (Florida State Univ., Tallahassee). *Vision Research;* 17: 165-168(1977).

Digitonin extracts of visual pigment from (a) fresh retinas, 8b) sucrose-floated rod outer segments, and (c) alum-treated rod outer segments from cattle (A_1), frog (R. pipiens, A_1), and sunfish (Lepomis punctatus, A_2) were studied by the method of flash photolysis at temperatures above 0°C. Time-resolved difference spectra (msec resolution) were constructed. The temperature dependence for MII formation was also studied. In all cases studied, the more extensive the preparation procedure, the slower was the sequence of intermediates traversed. This increase in thermal stability was reflected by large increases in both the half-time of formation of MII and the Arrhenius activation energy. It is suggested that some structural (catalytic?) moiety might be affected by the preparation procedure. The sequence of intermediates through MII is analogous for all preparations.

32515 **Extractant effects on some properties of rhodopsin.** Baker, B.N. (Inst. of Molecular Biophysics, Tallahassee, FL); Donovan, W.J.; Williams, T.P. *Vision Research;* 17: 1157-1162(1977).

The photosensitivity, thermal stability and rate of metarhodopsin II production of rhodopsin solubilized in five commonly used extracting agents have been determined and compared with rod outer segment suspensions. An effect of extracting agent on photosensitivity was found, indicating that the electronic interactions of the chromophore and protein are sensitive to the micellar environment. Both the rate of thermal decay and metarhodopsin II production were found to be a function of the detergent. Only digitonin gave rates which were comparable to those seen in rod outer segment suspensions.

32516 **Flash photolysis of visual pigments in solution--I. Time resolved difference spectra and their variation with temperature.** Bargoot, F.G.; Williams, T.P. (Florida State Univ., Tallahassee). *Vision Research;* 17: 37-44(1977).

The method of flash photolysis was employed to study the rapid color changes that occur in micellar digitonin-visual pigment preparations from the retinas of cattle (A_1), frog (R. pipeiens, A_1), and sunfish (Lepomis punctatus, A_2) at temperatures above 0°C. Intermediates beyond MII were not allowed to measurably accumulate. Time-resolved difference spectra were constructed (msec resolution) which indicate the (a) the rate of traversal of the bleaching sequence intermediates increases with increasing temperature; (b) the visual pigments of all the species studied bleach through analogous intermediates (at least through MII); and (c) lumirhodopsin is readily detectable in all the preparations at hand, up to at least 10°C.

5503 Cytology

REFER ALSO TO CITATION(S) 32133

32517 **(INIS-mf—7529) Investigations on the insulin receptor of isolated fat cells.** Eichler, W. (Tuebingen Univ. (Germany, F.R.). Fakultaet fuer Chemie und Pharmazie). 10 Oct 1980. 96p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83780445.

Thesis.

Fat cells, isolated from the epididymal adipose tissue of rats, were incubated with iodine 125 insulin after previous incubation with various antagonists. By varying the antagonist concentration, it was possible to determine the effect these substances have on the insulin receptor, i.e. the insulin similarity. By varying the preincubation time, toxicity of the test substances could be detected, which pretended repression effects; and by finally varying the incubation time the effects on the receptor via the membrane could be distinguished from direct receptor bindings of the antagonist.

5504 Genetics

REFER ALSO TO CITATION(S) 31402, 32508, 32584, 32603

32518 **(DOE/ER/10680—2) Study of the genetics and regulation of methane oxidation. Progress report, second year and a half, August 1, 1981-January 31, 1983.** (Washington Univ., Seattle (USA). Dept. of Microbiology). 1983. Contract AT06-80ER10680. 7p. NTIS, PC A02/MF A01. Order Number DE83011463.

The purpose is to develop mutagenesis, gene transfer and cloning systems in methanotrophic bacteria, and use these techniques to study the methane oxidation genes. Although we have been successful in the first part of these objectives, the study of methane oxidation genes has proven difficult. Problems arose due to the discovery that the culture, Methylobacterium ethanolicum, is in reality a stable coculture between two methylotrophs. These partners are Methylocystis POC, an obligate methanotroph and Xanthobacter H4.14, and autotrophic methanolutilizer. The Methylocystis strain contains the three plasmids we had observed previously in methane-grown cultures, while the Xanthobacter strain contains no detectible plasmids. Therefore, our original approach to studying the methane oxidation genes, that of isolating plasmid mutants, is no longer valid. However, our discovery of the nature of this culture has led to some interesting results which show promise in elucidating the genetic structure of the methane oxidation genes

in obligate methanotrophs. In addition, we have been successful in developing mutagenesis, gene transfer and cloning systems that are applicable to a wide variety of methanotrophs.

32519 Analysis of recombinant DNA clones of the endogenous BALB/c murine leukemia virus WN1802N: variation in long terminal repeat length. Boone, L.R. (Oak Ridge National Lab., TN); Myer, F.E.; Yang, D.M.; Kiggans, J.O.; Koh, C.; Tennant, R.W.; Yang, W.K. *Journal of Virology;* **45**: No. 1, 484-488(Jan 1983). Contract W-7405-ENG-26.

Fifteen recombinant DNA clones of the unintegrated closed circular DNA intermediate of the BALB/c endogenous ecotropic murine leukemia virus WN1802N were analyzed. Thirteen of these clones had an insert which corresponded to the complete murine leukemia virus genome. Of these, six contained a single long terminal repeat (LTR) and seven contained two LTRs. The viral genomes in nine clones had an LTR of 520 base pairs (bp), one had an LTR of 570 bp, three had an LTR of 600 bp, and one had an LTR of 670 bp. Restriction endonuclease analysis demonstrated that the size variability resides in the U3 region. Seven of eight clones which yielded infectious virus by DNA transfection had the 520-bp LTR, and the other had a 600-bp LTR. More detailed examination of plasmid subclones of three isolates with different-sized LTRs revealed that the approximate position which varies in the U3 region corresponds to the 72-bp repeat region of Moloney sarcoma virus. Possible consequences of these variations are discussed.

32520 Polypeptide structure and encoding location of the adenovirus serotype 2 late, nonstructural 33K protein. Oosterom-Dragon, E.A.; Anderson, C.W. (Brookhaven National Lab., Upton, NY). *Journal of Virology;* **45**: No. 1, 251-263(Jan 1983).

Radiochemical microsequence analysis of selected tryptic peptides of the adenovirus type 2 33K nonstructural protein has revealed the precise region of the genomic nucleotide sequence that encodes this protein. The initiation codon for the 33K protein lies 606 nucleotides to the right of the EcoRI restriction site at 70.7 map units and 281 nucleotides to the left of the postulated carboxy-terminal codon of the adenovirus 100K protein. The coding regions for these two proteins thus overlap; however, the 33K protein is derived from the +1 frame with respect to the postulated 100K reading frame. Our results contradict an earlier published report suggesting that these two proteins share extensive amino acid sequence homology. The published nucleotide sequence of the Ad2 EcoRI-F fragment (70.7 to 75.9 map units) cannot accomodate in a single reading frame the peptide sequences of the 33K protein that we have determined. Sequence analysis of DNA fragments derived from virus has confirmed the published nucleotide sequence in all critical regions with respect to the coding region for the 33K protein. Consequently, our data are only consistent with the existence of an mRNA splice within the coding for 33K. Consensus donor and acceptor splice sequences have been located that would predict the removal of 202 nucleotides from the transcripts for the 33K protein. Removal of these nucleotides would explain the structure of a peptide that cannot otherwise be directly encoded by the EcoRI-F fragment. Identification of the precise splice points by peptide sequencing has permitted a prediction of the complete amino acid sequence for the 33K protein.

5505 Metabolism

32521 (INIS-mf—7476) Contribution to the study of calcium metabolism in the deficiency of testosterone. Correa, S.M.J.C. (Universidade do Estado do Rio de Janeiro (Brazil). Inst. de Biologia). 1980. 96p. (In Portuguese). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83780431.

Thesis.

Kinetic parameters of calcium mobilization in rats were determined to estimate the role of testosterone in the metabolism of this ion. Calcium multicompartmental theory was combined to and used in measurements of metabolic balance (for $^{45}CaCl_2$ or $^{40}CaCl_2$). Three groups of 60 day old rats were used: G I-control; G II-castrated; G III-castrated and treated with testosterone propionate. Data were obtained from measurements of Ca^{++} in samples of plasma, feces and urine. Balance studies suggest that calcium level in blood plasma remained constant in all groups, the increase of bone reabsorption in groups II and III being counterbalanced by the elevation of the urinary excretion. This result implies the equilibrium occurring at renal level. Intestinal calcium absorption remained the same in the three groups of animals, indicating that testosterone has no consistent effect at intestinal level. The increase of total calcium in feces of groups II and III arises from a great endogenous secretion. A significant negative balance of calcium was also observed in these groups. This fact permits the conclusion that in the absence of testosterone the organism doesn't retain calcium efficiently.

32522 (NP—3901290) Oxygen isotope fractionation during photosynthesis and respiration of the marine diatom Thalassiosira rotula (Meunier). Zielke, H. (Bochum Univ. (Germany, F.R.). Abt. Biologie). 28 Jun 1979. 139p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901290.

Thesis.

On the basis of oxygen concentration measurements, the net photosynthesis rate and dark respiration rate in low-bacteria cultures of Thalassiosira rotula could be determined at temperatures of 5, 10, and 15°C and on illumination of 37 to 320 μEinstein m^{-2} sec^{-1} in enriched natural seawater. The maximum mean photosynthesis rates are between 273 and 558 μMol $O_2 h^{-1}$ mg Chl a^{-1}. The mean dark respiration rates are between 27 and 50 μMol O_2 h^{-1} mg Chl a^{-1}. At high oxygen concentrations, the production rate may be reduced, probably due to photo-respiration. By extracting the oxygen in a vacuum apparatus, the $^{18}O/^{16}O$ isotope ratio could be determined by mass spectrometry after conversion into CO_2, and the fractionation during respiration as well as the enrichment as compared to culture water can be calculated in oxygen released by photosynthesis. The mean fractionation factor during respiration is 1.02557; the mean enrichment during photosynthesis amounts to 7.6per mill. A mean excess value of 5.8per mill would remain even if dark respiration were maintained unmodified in the light phase. With the fractionation factors calculated for photosynthesis and respiration in the marine biocycle, a 2-compartment model of the global oxygen cycle has been validated. The values obtained for ^{18}O enrichment in the oxygen dissolved in the uppermost ocean water stratum show the best agreement so far with the real data obtained by measurement.

32523 (NUREG/CR—3245) Metabolic data and retention functions for the intracellular alkali metals. Leggett, R.W. (Oak Ridge National Lab., TN (USA)). May 1983. Contract W-7405-ENG-26. 90p. (ORNL/TM—8630). NTIS, PC A05/MF A01 - GPO. Order Number DE83011550.

This report is a collection and discussion of the information needed for interpretation of bioassay results for the important radioelement cesium (Cs), as well as a comparison of the physiological behavior of Cs with that of potassium (K) and rubidium (Rb). This report is intended not only as an investigation of the metabolism of the intracellular alkali metals by humans, but also as a case study of the limitations inherent in applying ICRP 30 retention models in bioassay programs. In particular, the relationship between the mathematical components of the ICRP 30 retention model for Cs and actual physiological or anatomical entities is examined, and ways are suggested for modifying the ICRP 30 models for Cs, Rb, and K to yield better accuracy and to better account for biological variability among humans. Although the physiological behaviors of both Rb and Cs resemble that of K, quantitative differences arise because of differences in transport of K, Rb, and Cs by cell membranes. The resemblance is close enough, however, that total body K can be used as an index of whole-body retention times of Rb and Cs, and of compartmental fractions of Cs. The Cs half-time based on total body K appears to be within a factor of 1.5 for all adults. Total body K may be determined by whole-body gamma-ray counting techniques and hence is a reasonable index to use in many bioassay programs.

32524 Demonstration of particulate accumulations in solid tissue. LeFevre, M.E.; Jablonski, H.M.; Pile, J.A.; Joel, D.D. *Experientia;* **37**: 786-787(1981).

A histological clearing procedure involving partial tissue hydrolysis by pancreatin is demonstrated. Changes in distribution of

5.7-μm latex particles in mouse liver and heart muscle 6 months after i.v. latex injection were quantitated. The method is useful for studies of long-term redistribution of particles in vivo and for locating large, infrequent particles which are difficult to find by ordinary tissue-sectioning techniques.

5506 Medicine

REFER ALSO TO CITATION(S) 32134, 32205, 32549, 32574, 32593, 32594, 32609, 32610, 32611, 32613, 32615, 32616

32525 **(BNL—32841) Mathematical methods in the formulation of pharmacokinetic models.** Rescigno, A.; Lambrecht, R.M.; Duncan, C.C. (Brookhaven National Lab., Upton, NY (USA); Yale Univ., New Haven, CT (USA)). 1983. Contract AC02-76CH00016. 61p. (CONF-830627—1). NTIS, PC A04/MF A01. Order Number DE83010853.

From Conference on tracer kinetics and physiologic modeling - theory to practice; St. Louis, MO, USA (6 Jun 1983).

A few mathematical methods used in the quantitative analysis of the behavior of drugs (including radiopharmaceuticals) introduced into a living organism are described. The aim was to give an idea of the range of possibilities that are open to the investigator willing to put on more quantitative grounds the results of his investigations.

32526 **(CEA-CONF—6121) Lung uptake of ^{11}C-imipramine and ^{11}C-propranolol in patients with sarcoidosis evaluated by positron emission tomography.** Pascal, O.; Syrota, A.; Berger, G.; Sastre, J.; Collard, P.; Hychon, G.J.; Chretien, J. (CEA, 91 - Orsay (France). Service Hospitalier Frederic Joliot). Sep 1981. 12p. (CONF-8108140—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700351.

From 9. international conference on sarcoidosis; Paris, France (31 Aug 1981).

To evaluate the possible relationships between the stage of sarcoidosis and the amount of cells in the lung, we studied the lung radioactive concentrations of two molecules which are greatly extracted there. Twelve patients, in supine position, were injected with an intravenous bolus of Imipramine or Propranolol labelled by cyclotron-produced ^{11}C. By Positron Emission Tomography 15 sequential images (2 min each) of a single transverse chest section were obtained. Curves of tracer concentration per cm^3 of lung and per mCi of injected dose were plotted versus time and fitted as a single exponential. Only washout decay-constants were significatively lower ($p < 0.02$) in 5 subjects with sarcoidosis pulmonary infiltration (0.35 +- 0.11 h^{-1}, M +- S.D.) than in 5 normal subjects (1.39 +- 0.52 h^{-1}) or the 2 without pulmonary infiltration (0.92 and 1.19 h^{-1}). These data suggest a change in regional blood flow conjugated with a qualitative modification of the lung pools of the two products.

32527 (CONF-8010206—Vol.2, pp vp) **Prospects for charged particle uses in oncology.** Ruderman, A.I. (Akademiya Meditsinskikh Nauk SSSR, Moscow. Onkologicheskij Nauchnyj Tsentr). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Prospects and problems of proton therapy by means of accelerators are considered. Approaches to the solution of the problems concerning operation modes of the accelerator are formulated. It is shown that despite vivid advantage of charged particles for their applied use in beam therapy of malignant tumour it is necessary to solve two problems: extraction of special beams meeting strict medical requirements and development of technology of irradiation of malignant tumours of different localizations and construction of special equipment for execution of this technology. Engineering-technological shortcomings of proton therapy and medical-biological problems requiring resolution are enumerated.

32528 (CONF-8010206—Vol.2, pp vp) **Application of the betatron with the 2-6 MeV extracted electron beam in radiotherapy.** Belyaev, N.V.; Belyaeva, T.L. (Tomskij Meditsinskij Inst. (USSR)); Zrelov, Yu.D.; Chakhlov, V.L. (Tomskij Politekhnicheskij Inst. (USSR). Nauchno-Issledovatel'skij Inst. Ehlektronnoj Introskopii); Lisin, V.A.; Kitsmanyuk, Z.D.; Novikov, V.A.; Choinzonov, E.Ts. (Akademiya Meditsinskikh Nauk SSSR, Tomsk. Onkologicheskij Nauchnyj Tsentr). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The investigation results of the characteristics of the electron beam and peculiarities of its absorption in tissue-equivalent materials for obtaining data necessary for betatron application in beam therapy are presented. Water phantom is the tissue-equivalent medium. Curves of the absorbed dose in the phantom depth for the collimator of 20 mm and 40 mm diameter at the electron energies of 1.6; 2.6; 3.8; 4.8 and 6 MeV are presented. The results of electron therapy of benign new formations and malignant tumours of the lower lip and skin are given. It is shown the dose of 6-12 Gy is enough for complete fulguration of warts and decrease of malignant new formations at the dose of 35-40 Gy, while complete resorption took place at 55-65 Gy.

32529 **(DOE/ER/60048—T1) Chemistry and biology of Tc-99m renal function radiopharmaceuticals. Final report, May 1, 1982-January 15, 1983.** (Colorado Univ., Denver (USA). Medical Center). 1983. Contract AC02-82ER60048. 22p. NTIS, PC A02/MF A01. Order Number DE83010279.

Portions are illegible in microfiche products.

Progress is reported on research conducted during the period May 1, 1982 to January 15, 1983. The chemistry and biology of two possible renal function radiopharmaceuticals, Tc-99m N, N'-bis (mercaptoacetyl)-2,3-diamino-propanoate (Tc-99m CO_2DADS, 1(X=OH)) and the Tc-99m complex of penicillamine. (ACR)

32530 **(INIS-mf—7482) Nuclear medical investigations of renal transplants in dogs. Early diagnosis of transplant function in comparison with usual methods.** Chocholka, T.G.K. (Muenchen Univ. (Germany, F.R.). Fachbereich Medizin). 5 May 1981. 109p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83780437.

Thesis.

Within the frame of this study it was investigated if it is possible - by means of nuclear medicine - to assess transplant function after xenogenic (heterologic) renal transplantation, to early diagnose complications and to observe organ function in follow-up examinations. The examination comprised camera-function-scintiscanning (=CFS), i.e. camera-sequence-scintiscanning (=CSS) and radio-isotope-nephrography (=RING), and the clearance measurement, which were carried out in parallel, as one operation. The clearance measurement based on tissue activity decrease graphs, which were registered by means of a body probe. Hippuran iodine 131 was used as radiopharmaceutical which usually is eliminated by the kidneys. In 112 examinations 33 dogs, who had received a fox kidney transplant, were investigated, starting on the day of surgical intervention until the transplant dysfunction was confirmed. These dogs had been treated in advance with immunosuppressive agents: a control group of 8 dogs, who received renal transplants of dingos, were not treated with immunosuppressants. The CFS as simultaneous realisation of CSS and of RING and the clearance measurement by means of hippuran iodine 131 achieved the examination aims. CSS permitted a sufficient survey over the individual functional phases. RING allows the early diagnosis of complications due to transplantation. The nuclear medical findings of camera-functional-scintiscanning and of clearance measurement show correspondence and they correspond also well to those findings resulting from traditional examination techniques which were applied in parallel. This procedure distinguishes itself not only by the diagnostic liability of nuclear medical examination methods, but also by its uncomplicated application, which permits the careful treatment of the dogs.

32531 (INIS-mf—7483) **Investigations on the value of sonographic and radiographic diagnosis of Gall-Bladder diseases. A retrospective assessment of 267 cases.** Schmidt, H. (Muenchen Univ. (Germany, F.R.). Fachbereich Medizin). 29 Jan 1981. 95p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83780435.

Thesis.

The pathologico-sonographical findings of 267 patients were put into contrast with the corresponding radiographic findings and/or the surgically confirmed final diagnosis. In 147 patients the diagnosis was not verified surgically. In 86 patients the sonographic and radiographic findings were compared with the surgically confirmed final diagnosis. The rate of correspondence of ultrasound findings and surgically confirmed final diagnoses was 93.1%. Of these, 10.5% of the cases showed partial correspondence. The radiographic findings were verified in 87.2% by the surgically confirmed final diagnosis. Of these, 52.3% were negative cholecystograms. The comparison of sonographic and radiographic findings with the surgically confirmed final diagnosis led to the result that with respect to the assessment of the gall bladder, ultrasound diagnostics provides more information than contrast media examinations. Because of the high degree of accuracy, because of the possibility to establish more differentiated findings and because of the total absence of any risks, it is recommended to apply ultrasound in the first examination when there is the suspicion of a gall-bladder disease. (orig./MG).

32532 (INIS-mf—7486) **Variability of intraductal papillomas of the mammary gland: Clinical, roentgenologic and morphologic investigations.** Rummel, W. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Fachbereich Medizin). 1974. 82p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83780436.

Thesis.

The radiodiagnostical method of choice is the galactographic technique. However, a specific X-ray image of the papilloma does not exist. The galactographic technique has to be adapted to the surgical and histologic one. Only by combining these three techniques good results can be achieved. It is not possible to draw conclusions from the colour of the pathologic discharge about the type and character of the pathologic process. Contrary to the findings documented in the literature, we were able to diagnose with our technique not only small tumours, but also tumours situated in the periphery of the lactiferous duct. Because of our investigations it is no longer possible to maintain and keep the strict division of the proliferative changes occurring at the lactiferous duct walls. In this study, the most significant morphologic results are described in detail. In all patients with pathologic discharge of the mammary gland, the so-called papillo-carcinoma was found only in one case. As clinical consequence it has therefore to be demanded that in all women with the symptom of pathologic mamillary discharge first of all the origin of this discharge has to be localised by means of galactography. Only the individual morphologic picture of a proliferative change of the lactiferous duct provides some prognostic value. The prerequisites for such an individual assessment are differentiated roentgenologic, surgical and histological techniques.

32533 (INIS-mf—7498, pp vp) **Radiation dose given in pediatric radiology to some radiation sensitive organs.** Schlesinger, T. (Israel Atomic Energy Commission, Yavne. Soreq Nuclear Research Center). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

32534 (INIS-mf—7498, pp vp) **Factors affecting the precise dosage determination in the fetus from diagnostic radiology.** Acram, S.Y. (Amsterdam Univ., Netherlands). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

32535 (INIS-mf—7498, pp vp) **Radiation exposure of physicians performing orthopedic operations under fluoroscopy.** Tatcher, M.; Zinman, C. (Rambam Government Hospital, Haifa (Israel); Technion-Israel Inst. of Tech., Haifa); Schlesinger, T. (Israel Atomic Energy Commission, Yavne. Soreq Nuclear Research Center). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

32536 (INIS-mf—7499, pp vp) **Comparison of occupational exposure from some X-ray and radioisotope examinations.** Husak, V. (Fakultni Nemocnice, Olomouc (Czechoslovakia). Oddeleni Nuklearni Mediciny); Sevc, J. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni); Zezulka, L. (Mestska Hygienicka Stanice, Oddeleni Hygieny Zareni, Ostrava (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32537 (INIS-mf—7499, pp vp) **Radiation burden of patients during radiodiagnosis.** Kodl, O.; Snobr, J.; Bucina, I.; Kliment, V.; Mikusova, M. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32538 (INIS-mf—7527) **Influence of various disinfectants on the radioimmuno assay for Australia antigen.** Bernhard, U. (Mainz Univ. (Germany, F.R.). Fachbereich Medizin). 1979. 67p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83780444.

Thesis.

At normal room temperature dilution series were produced out of pooled serum, serum previously treated with UV irradiation and beta propiolacton, and serum of patients with hepatitis type B and various disinfectants. After differing incubation times the Australia antigen titre was measured in the radioimmunoassay. Electronmicroscopic examinations should detect possible morphologic changes of the Dane particles. The counts/min. measured for Australia antigen after an incubation with aldehyde-containing preparations, are below the limit value with serum treated previously with UV light and beta propiolacton; in negative Australia-antigen-positive serum the counts/min. are close to the limit value. The antigenity is clearly reduced. The comparison with an insulin containing serum showed that also the radioimmunoassay was influenced by the aldehyde. A direct influence of the aldehydes on the protein seems to be possible. From this results that the radioimmunoassay for Australia antigen cannot be used as the exclusive method for measuring the efficacy of disinfectants compared to Dane particles. The morphologic changes of the Dane particles observed in the electronic microscope confirm the supposition that the disinfectants influence the hepatitis viruses.

32539 **Technetium-99m: an historical perspective.** Richards, P.; Tucker, W.D.; Srivastava, S.C. (Brookhaven National Lab., Upton, NY (USA)). *International Journal of Applied Radiation and Isotopes;* 33: No. 10, 793-799(Oct 1982).

The importance of ^{99m}Tc in the development of diagnostic nuclear medicine, over the past 30 yrs. is discussed. Tc-99 is the ideal radiotracer and since the introduction and development of the BNL ^{99}Mo/^{99m}Tc Radioisotope Generator in the 1950's, and the development of ^{99m}Tc labelled compounds for thyroid, brain and bone-marrow imaging. The field of diagnostic nuclear medicine has grown exponentially.

32540 **Temporal effects and interactions in cancer: implications of carcinogenic models.** Thomas, D.C. (McGill Univ., Quebec). pp 107-121 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

The multistage model of carcinogenesis provides a general description of how cancer incidence rates might be influenced by the intensity of exposure to various carcinogens. For a single carcinogen acting at a single stage, the model can be cast in the form of a two-stage model, consisting of an initiation stage followed by a variable latent period. It is shown that the shape of the latent period distribution then depends on the stage at which the carcinogen acts, and is also influenced by age at exposure and age at risk, in such a way that the prospective and retrospective views of the latent period distribution differ. For extended exposures, rates depend on both age and duration of exposure. When the carcinogen acts at two stages, the dependence on intensity of exposure is a mixture of linear and quadratic terms, both having a complex dependence on age and duration of exposure. For two carcinogens, the risk depends on the stages at which they act and the time between the two exposures. If both exposures are constant in intensity for an entire lifetime, then the interaction will be either additive (if both act at the same stage) or multiplicative (if they act at different stages). If both exposures are instantaneous and act at different stages, the interaction can vary from additive (if the later stage carcinogen is applied before the earlier stage one) to much more than multiplicative (if the later stage carcinogen is applied a suitable time after the earlier stage one). These findings have important implications for the construction of indices of effective exposure in the analysis of long term exposure effects in epidemiologic studies.

32541 **Use of case series data for risk assessment.** Walker, A.M. (Sidney Farber Cancer Inst., Boston, MA). pp 193-201 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

Data from a series of cases can be sufficient for epidemiologic inference without recourse to comparison series of non-diseased controls. The key is to search out relevant ways in which the cases themselves may be heterogeneous. Discussion is presented under the headings: case-heterogeneity studies, etiology and prognosis, comparisons between diseases, interaction of causal agents, and implementation in the context of clinical trials.

5507 Microbiology

REFER ALSO TO CITATION(S) 32518

5508 Morphology

REFER ALSO TO CITATION(S) 32500

5509 Pathology

REFER ALSO TO CITATION(S) 32547, 32603

5510 Physiological Systems

32542 **(ABCC-TR—27-64) Correlations between tests of aging in Hiroshima subjects: an attempt to define physiologic age.** Hollingsworth, J.W.; Hashizume, A.; Jablon, S. (Atomic Bomb Casualty Commission, Hiroshima (Japan); Atomic Bomb Casualty Commission, Nagasaki (Japan)). [nd]. Contract AC01-76EV03161. 20p. (In English and Japanese). NTIS, PC A02/MF A01. Order Number DE83010787.

Nine physiologic functions which change with age were measured in 437 subjects during their regular visits to the Atomic Bomb Casualty Commission clinic in Hiroshima, Japan. This pilot study was undertaken to determine the feasibility of collecting such data in a population sample, and to provide data for statistical formulation of a combined physiologic age score. The study demonstrated that adequate sample data could be obtained, and that statistical treatment could construct a physiologic age for individual subjects. However, the tests were of limited value below age 40, and the validation of the concept of physiologic age requires eventual correlation with mortality. Since the ABCC program includes a highly accurate mortality survey, it is hoped that data on physiologic aging can be collected and eventually related to mortality.

32543 **(INIS-mf—7477) Study of the immune response to thyroglobulin through a model of experimental autoimmune thyroiditis.** dos Santos Castro, M. (Universidade do Estado do Rio de Janeiro (Brazil). Centro Biomedico). 1981. 100p. (In Portuguese). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83780430.

Thesis.

The cellular and humoral immune response to thyroglobulin of different species was studied in guinea pigs. The experiments described suggested that the immune system can be activated against self-determinants. Human and pork thyroglobulin were able to induce the experimental thyroiditis as well as some immune responses, such as in vitro proliferative response, delayed hypersensitivity and antibodies. Although guinea pig thyroglobulin was unable to induce specific T-lymphocyte proliferation in vitro, delayed hypersensitivity response and antibodies, it was very efficient in inducing the autoimmune thyroiditis. On the contrary, bovine thyroglobulin did not induce experimental autoimmune thyroiditis despite producing good responses as determined by similar in vitro proliferative response, delayed hypersensitivity and on the humoral level. These results suggest that the assays utilised were not able to evaluate the relevant immune response to genesis of the thyroiditis. The determinant selection mechanisms operating in these immune responses are probably selecting determinants not responsible for self-recognition in vivo. It was suggested that the macrophage could be the cell responsible for the presentation of these determinants to the lymphocyte in an immunogenic form.

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

5601 Radiation Effects

REFER ALSO TO CITATION(S) 31752, 32458, 32460, 32461, 32464, 32464, 32464, 32482, 32523, 32537, 32609

32544 **(ABCC-TR—1-71) Fluoroscopy and radiation therapy exposure reported by ABCC-JNIH Adult Health Study subjects, Hiroshima. Pilot studies.** Sawada, S.; Takeshita, K.; Yamamoto, O.; Russell, W.J.; Land, C.E.; Fujita, S. (Atomic Bomb Casualty Commission, Hiroshima (Japan); Atomic Bomb Casualty Commission, Nagasaki (Japan)). 1971. Contract AC01-76EV03161. 27p. (In English and Japanese). NTIS, PC A03/MF A01. Order Number DE83011559.

Frequency and location of exposure of ABCC-JNIH Adult Health Study subjects to fluoroscopy and radiation therapy were ascertained in two pilot surveys. Responses of subjects for examinations known to have been received were somewhat unreliable, even when obtained by interview. The impracticality of searching hospital records for exposure factors prevents routine dose estimates for examinations reportedly received at other institutions. Numbers of fluoroscopy examinations reported have potential future value in evaluating any subsequent diseases attributable to ionizing radiation among A-bomb survivors. All reported radiation therapy exposures will be routinely verified by hospital records and corresponding doses estimated.

32545 **(ABCC-TR—14-64) JNIH-ABCC Life Span Study Hiroshima and Nagasaki. Report 4. Mortality in A-bomb survivors by age cohorts 1950-59.** Ishida, M.; Jablon, S. (Atomic Bomb Casualty Commission, Nagasaki (Japan); Atomic Bomb Casualty Commission, Hiroshima (Japan)). [nd]. Contract AC01-76EV03161. 32p. (In English and Japanese). NTIS, PC A03/MF A01. Order Number DE83011599.

The mortality experience of a cohort of approximately 100,000 persons selected from survivors of the Hiroshima and Nagasaki atomic bombings and a comparison of persons who were not in the cities at the time of bombing (ATB) was studied for the period 1 October 1950-30 September 1959. The main findings were: (1) there is evidence that the survival among those who were located within 1400m from the hypocenter was lower than that for persons located at 1400-9999m or for those not in the cities ATB; (2) for age group 0-19 ATB, the mortality rates decreased regularly with increasing distance out to 2000m, and increased regularly with increasing estimated radiation dose. However, such relations were not observed in other age groups; (3) among those who were under age 40 ATB, mortality rates were higher in those who reported acute radiation injury than in those who denied it; (4) a comparison of mortality rates between non-or lightly shielded survivors and those heavily shielded revealed no statistically significant difference; (5) no difference in mortality was seen between those reporting and those not reporting burns from the bombing; and (6) as to causes of death, leukemia mortality was very high at all ages among the survivors within 1400m. In the same group, the mortality rate from malignant neoplasms excluding leukemia was significantly high in Hiroshima females aged 40-59 ATB and tuberculosis mortality in Hiroshima males was significantly high in age groups 20-39 and 40-59 ATB.

32546 **(ABCC-TR—26-70) Childhood cancer in relation to prenatal exposure to A-bomb radiation.** Jablon, S.; Kato, H. (Atomic Bomb Casualty Commission, Hiroshima (Japan); Atomic Bomb Casualty Commission, Nagasaki (Japan)). 1970. Contract AC01-76EV03161. 10p. (In English and Japanese). NTIS, PC A02/MF A01. Order Number DE83011437.

The juvenile cancer experience of 1292 children exposed prenatally in 1945 to the atomic bombs in Hiroshima and Hagasaki has been studied. There was no significant excess of mortality from leukemia or other cancers. This experience is not consistent with the specific model for carcinogenesis as a result of prenatal x-ray, advanced recently by Stewart and Kneale, and consistency can be obtained only by a drastic reduction in the value of the linear coefficient in the Stewart-Kneale model.

32547 **(AECL—6822) Action of hyperthermia on gene expression in Friend erythroleukemia cells by dimethyl sulfoxide or X-rays.** Raaphorst, G.P.; Azzam, E.I.; Einspenner, M.; Ewing, D.; Borsa, J. (Atomic Energy of Canada Ltd., Pinawa, Manitoba. Whiteshell Nuclear Research Establishment). Feb 1982. 57p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83700315.

The effect of heat on gene control and on cell killing by X-rays or dimethyl sulfoxide (DMSO) was studied in cultured Friend erythroleukemia cells (FELC). FELC are very sensitive to heat and X-rays in terms of survival, as measured by the colony-forming assay. Heat inactivation kinetics are similar for FELC and Chinese hamster cells. Thermal enhancement of cell inactivation by irradiation was observed at 42.0 and 45.0deg C, and increased as a function of heating time. The simultaneous application of heat and X-rays had a greater effect in terms of cell inactivation. Dimethyl sulfoxide could induce FELC to synthesize hemoglobin, and hyperthermia could inhibit this response. Likewise, hyperthermia could affect induction of heme synthesis by irradiation. Heating before irradiation enhanced production of heme synthesis, whereas heating after irradiation inhibited induction of heme synthesis. The effects of hyperthermia on the survival and gene induction endpoints were compared. Thus, heat can affect both cell survival and gene induction by irradiation or DMSO. The two endpoints of gene induction and survival (proliferative capacity) responded differently, both quantitatively and qualitatively, to heat and X-rays, implying that different cellular targets are affected for each of these endpoints.

32548 **(BNL—32840) Effects of low-level radiation upon the hematopoietic steam cell: implications for leukemogenesis.** Cronkite, E.P.; Bond, V.P.; Carsten, A.L.; Miller, M.E.; Bullis, J.E. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 26p. (CONF-830450—1). NTIS, PC A03/MF A01. Order Number DE83010855.

From IAEA/WHO symposium on biological effects of low level radiation; Venice, Italy (11 Apr 1983).

These studies have addressed firstly the effect of single small doses of x-ray upon murine hematopoietic stem cells to obtain a better estimate of the D/sub q/. It is small, of the order of 20 rads. Secondly, a dose fractionation schedule tht does not kill or perturb the kinetics of hemopoietic cell proliferation was sought in order to investigate the leukemogenic potential of low level radiation upon an unperturbed hemopoietic system. The studies reported herein show tht 1.25 rads every other day decrease the CFU-S content of bone marrow by the time 40 rads are accumulated. Studies on the effect of 0.5, 1.0, 2.0, and 3.0 rads 3 times per week are under way. Two rads 3 times per week produced a modest decrease in CFU-S content of bone marrow after an accumulation of 68 rads. With 3.0 rads 3 times per week an accumulation of 102 rads produces a significant decrease in CFU-S content of bone marrow. Dose fractionation at 0.5 and 1.0 rad 3 times per week has not produced a CFU-S depression after accumulation of 17 and 34 rads. Radiation leukemogenesis studies published to date have utilized single doses and chronic exposure schedules that probably have significantly perturbed the kinetics of hematopoietic stem cells. Whether radiation will produce leukemia in animal models with dose schedules that do not perturb kinetics of hematopoietic stem cells remains to be seen.

32549 **(CEA-CONF—6140) Radiation protection in the operation of the X-ray generator CGR SECURIX 95030 No. 7, 777 set up at the Pierre Abrami Centre - Hopital Beaujon - Clichy.** Petit, G.; Fracas, P. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Dec 1981. 19p. (In French). (CONF-811263—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700348.

From Conference on protection during medical use of ionizing and non ionizing radiations; Cannes, France (14 Dec 1981).

The CGR SECURIX 95030 X-ray generator No. 7 777 set up at the Pierre Abrami Centre, is intended for watching the placing of catheters in animals by means of a brilliancy intensifier. When the probe is introduced, the hands of the operator are partly exposed to the radiation of the direct beam and his body is exposed to the leak radiation or the scattered radiation. At the present time, protection is provided by a tube restricting the aperture of the beam and a lead apron worn by the operator. The absorbed doses registered during this study show that it is necessary to increase the existing means of protection and to limit the working time of the operator.

32550 **(CEA-N—2273) Effects of acute and chronic experimental contamination on direct cesium 137 uptake by the eel, Anguilla anguilla L.** Foulquier, L.; Lambrechts, A. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Mar 1982. 27p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700316.

This study covers the effects of different types of contamination on direct cesium 137 uptake by the eel. In the first experiment (acute contamination), simulating a waste discharge, the fish were kept in water with a rapidly decreasing cesium 137 activity. In a second experiment (chronic contamination), the water activity increased constantly, simulating increasing waste frequency and activity levels. Irrespective of the type of contamination, radiocesium retention by eels is low (<1% of initial activity); comparable specific activity levels, concentration factors (FC <= 2 after 36 days) and cesium 137 body distribution, were obtained. Therefore, direct cesium 137 uptake by the eel is very low and the water contamination mode alone cannot explain the major concentration factor variations observed in situ.

32551 (CEA-R—5160) Evolution of late blood damage from decreasing doses of ^{241}Am following injection in the rat. Maillard, M.J.; Boncorps, J. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Apr 1982. 33p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700317.

Rats were given intravenous or intramuscular injections of ^{241}Am at decreasing doses ranging from 7.5 μCi to 0.075 μCi per kg of body weight. Blood examinations showed that higher doses exerted an irreversible destructive effect on all blood cells. As the administered doses decreased, the destructive effect of ^{241}Am dropped and even became reversible for white cells. Proliferative disorders such as leukocytosis with myelemias, leukemias -chiefly acute or chronic granulocytic leukemias- were then demonstrated. Red cells only dropped but more and more slowly. At the lowest doses, life-span shortening was the most evident effect.

32552 (CEA-R—5162) Radiation preservation of food. Efficiency and wholesomeness. Saint-Lebe, L.; Raffi, J.; Henon, Y. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Mar 1982. 196p. (In French). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83700319.

This document reviews the applications of ionizing radiations in the food industry. The two first chapters feature the characteristics of the three types of ionizing radiations that can be used (gamma rays from cobalt 60 and caesium 137, X rays, electron beams) and their action on foodstuff and the food spoilage organisms. The third chapter is a review of toxicological studies based on two complementary approaches: animal assays and studies on the radiolysis products. It provides the evidences that lead the international experts to regard irradiated food as safe for human consumption. In the fourth chapter, the problems of identification of irradiated food and the possible controls are exposed. The authors conclude by suggesting the measures that would allow commercial application in France.

32553 (CONF-8110126—8) Long-term health effects of thorium compounds on exposed workers: the complete blood count. Conibear, S.A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83010634.

From International meeting on the radiobiology of radium and actinides in man; Lake Geneva, WI, USA (12 Oct 1981).

Two hundred seventy-three men exposed to thorium and other rare earths between 1940 and 1973 at a plant which refined monazite sand were studied at Argonne National Laboratory from 1976 to 1980. In vivo measurements of body burden were made by counting gamma rays emitted by daughter products of retained thorium and by measuring exhaled thoron. Health status was ascertained through questionnaire, physical examination, and clinical laboratory tests. Measured body burden was found to be higher in those with a history of longer exposure. All parameters of the complete blood count were examined for evidence of an effect due to thorium. Comparisons of high and low body burden groups showed that only age and cigarette smoking had an effect on complete blood count parameters.

32554 (CONF-8110126—9) Dose-response relationships for radium-induced bone sarcomas. Rowland, R.E.; Stehney, A.F.; Lucas, H.F. Jr. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 39p. NTIS, PC A03/MF A01. Order Number DE83010703.

From International meeting on the radiobiology of radium and actinides in man; Lake Geneva, WI, USA (12 Oct 1981).

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The incidence of bone sarcomas among 3055 female radium-dial workers who entered the dial industry before 1950 was used to determine dose-response relationships for the induction of bone sarcomas by radium. Two subpopulations were analyzed: all measured cases who survived at last five years after the start of employment and all cases who survived at least two years after first measurement. The first constituted a group based on year of entry; it contained 1468 women who experienced 42 bone sarcomas; the expected number was 0.4. The second comprised a group based on first measurement; it contained 1257 women who experienced 13 bone sarcomas; the expected number was 0.2. The dose-response function, $I = (C + \alpha D + \beta D^2)e/sup\ -\gamma D/$, and simplifications of this general form, were fit to each data set. Two functions, $I = (C + \alpha D + \beta D^2)e/sup\ -\gamma D/$ and $I = (C + \beta D^2)e/sup\ -\gamma D/$, fit the data for year of entry ($p \geq 0.05$); both these functions and $I = (C + \alpha D)$ fit the data for first measurement. The function $I = (C + \beta D^2)e/sup\ -\gamma D/$ was used to predict the number of bone sarcomas in all other pre-1950 radium cases (medical, laboratory, and other exposure); fewer were actually observed than the fit of this function to the female dial workers predicted.

32555 (CONF-8110126—10) Distribution and retention in bone of ^{226}Ra and comparison with the ICRP 20 model. Holtzman, R.B.; Rundo, J.; Sha, J.Y.; Spaletto, M.I. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 34p. NTIS, PC A03/MF A01. Order Number DE83010639.

From International meeting on the radiobiology of radium and actinides in man; Lake Geneva, WI, USA (12 Oct 1981).

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Analyses are presented of the ratios of ^{226}Ra to calcium in over 650 samples of compact and cancellous bone from 66 female and 26 male subjects who had died from less than one to 60 years after first exposure to radium. The ^{226}Ra/Ca ratios were normalized to the terminal ^{226}Ra skeletal content. The ^{226}Ra/Ca ratios for vertebrae were essentialy identical to those for other cancellous bone for a given subject. Comparisons of the data with predictions of the ICRP model of alkaline earth metabolism show that for female cancellous bone the normalized ^{226}Ra/Ca ratios tended to be greater than predicted, while those for female cortical bone (femoral and tibial shaft) tended to be less. The data for males were fitted better by the model. A modification of the model to reduce the amount of radium deposited in soft tissue fitted the data better in some respects. A straight line linear least squares fit to the data appeared to fit as well as, or better than, the models. A radiation effect was suggested in that the normalized ^{226}Ra/Ca ratio for vertebrae relative to the ratio expected increased with skeletal absorbed dose for vertebra. However, no such effect was apparent for compact bone or for the cancellous bone as a whole.

32556 (CONF-8110126—11) Consideration of age-dependent radium retention in people on the basis of the beagle model. Parks, N.J.; Keane, A.T. (California Univ., Davis (USA). Lab. for Energy-Related Health Research; Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 30p. NTIS, PC A03/MF A01. Order Number DE83010640.

From International meeting on the radiobiology of radium and actinides in man; Lake Geneva, WI, USA (12 Oct 1981).

Portions are illegible in microfiche products.

This paper examines in humans the proposition emanating from studies in beagles that long-term retention of radium varies in proportion to the calcium addition rate at the time of intake. Because data on the calcium addition rate in younger humans were fragmentary, human calcium-addition rates were scaled from those in beagles, the relative calcium accretion rates in the two species at equivalent stages of skeletal growth providing the scaling factor. The variation of radium retention with age was determined by fitting a modified power function to data on the retention of radium from about 30 to 15,000 days following a series of therapeutic injections of ^{226}Ra in humans ranging in age from 18 to 63 yr. The fractional retention R at t days following a single injection of ^{226}Ra was described by $R = (1 + t/d)^{-0.44}$. The age-dependent time constant d in the retention function was found to be proportional to the calcium addition rate at the time of injection in subjects receiving < 200 μg ^{226}Ra.

32557 (CONF-8110126—12) Retention of uranium in the chest: implications of findings in vivo and postmortem. Keane, A.T.; Polednak, A.P. (Argonne National Lab., IL (USA); New York State Dept. of Health, Albany (USA). Div. of Epidemiology). 1981. Contract W-31-109-ENG-38. 33p. NTIS, PC A03/MF A01. Order Number DE83010638.

From International meeting on the radiobiology of radium and actinides in man; Lake Geneva, WI, USA (12 Oct 1981).

An unusually protracted retention of uranium in the chests of certain workers at a uranium-processing plant has been reported in the literature. This finding has implications for the protection of current uranium workers and for health-effects studies of early workers. It is shown that the limited data obtained postmortem that have been reported do not reveal a significant unusually protracted retention of uranium in the pulmonary region or in the tracheobronchial lymph nodes. Probable explanations of the disparate findings are discussed. Data are presented on mortality from cancers of lymphatic tissues among males who worked in the period from 1943 to 1947 at the Y-12 Plant, Tennessee-Eastman Corp., Oak Ridge. No increased mortality from these cancers was evident.

32558 (DPST—82-475) **Relative hazard of DWPF reference glass canister ICRP 2 vs ICRP 30.** Marter, W.L. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 16 Jul 1982. Contract AC09-76SR00001. 20p. NTIS, PC A02/MF A01. Order Number DE83012457.

The hazard of SRP high-level radioactive waste (HLW) in a glass canister was calculated relative to uranium ore with BEIR III dose-effect estimates and with dose constants from ICRP Publication 2 and ICRP Publication 30. With ICRP 2 constants (which are the current basis for DOE and NRC standards) the waste is calculated to have equivalent hazard to the uranium ore at about 300 years. The proposed constants in ICRP 30 increase the time for equivalency to about 400,000 years, although they decrease the absolute hazards. This change is caused predominantly by a large decrease in the dose constant for Ra-226 and a large increase in the constant for Np-327 in ICRP 30. Ra-226 is a daughter product in the Pu-238-U-234 decay chain in HLW and is in secular equilibrium with U-238 and U-234 in uranium ore. Np-237 is a daughter product of the Pu-241-Am-241 decay chain. If the ICRP 30 dose constant for Np-237 is reduced as has been recommended recently, the time for hazard equivalency of HLW and uranium ore is reduced to 30,000 years. Again it should be emphasized, although the hazard of HLW relative to uranium ore is higher and lasts longer with ICRP 30, the absolute hazard is less than with ICRP 2.

32559 (INIS-mf—7499, pp vp) **Relationship between taken-in activity and biological effect in externally irradiated persons.** 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts.).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32560 (INIS-mf—7499, pp vp) **Soap with increased deactivation efficiency.** Severa, J.; Knajfl, J. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)); Cmolik, J. (Severoceske Tukove Zavody, Usti nad Labem (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32561 (INIS-mf—7499, pp vp) **Analysis of chromosome picture of tritium-contaminated personnel.** Stojkovic, J.; Herchl, M. (Atomova Elektraren Bohunice, Jaslovske Bohunice (Czechoslovakia)). 1980. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32562 (INIS-mf—7499, pp vp) **Delayed effects of radiation exposure from inhalation.** Sevc, J.; Vernerova, P. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni); Placek, V. (Ustav Hygieny Prace Uranoveho Prumyslu, Kamenna (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32563 (INIS-mf—7499, pp vp) **Monitoring of personnel handling plutonium.** Chysky, J.; Hoelgye, Z.; Garba, A. (Ustav Hygieny Prace v Uranovem Prumyslu, Pribram (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32564 (INIS-mf—7499, pp vp) **Interpretation of results of measuring personnel exposure from neutron sources.** Piflova, L. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni); Spurny, F. (Ceskoslovenska Akademie Ved, Prague. Ustav Dozimetrie Zareni). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32565 (INIS-mf—7499, pp vp) **Rapid estimation of neutron dose. I.** Prouza, Z. (Karlova Univ., Prague (Czechoslovakia). Biofyzikalni Ustav); Kubeckova, J. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia). Fakulta Jaderna a Fysikalne Inzenyrska). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32566 (INIS-mf—7499, pp vp) **Rapid estimation of neutron dose. II.** Prouza, Z. (Karlova Univ., Prague (Czechoslovakia). Biofyzikalni Ustav); Bucina, I. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni); Neruda, O. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)); Nikodemova, D. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)); Spurny, F. (Ceskoslovenska Akademie Ved, Prague. Ustav Dozimetrie Zareni). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32567 (INIS-mf—7499, pp vp) **Problems of estimating radiation burden in neutron irradiation of large organisms.** Salava, J. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32568 (INIS-mf—7499, pp vp) **Personnel dosimetry in Dukovany nuclear power plant. II. Project of individual dosimetric control department and of its relationship to nuclear power plant.** Singer, J.; Konecny, J. (Zavod pro Pripravu Provozu a Kadru Jadernych Vyroben CEZ, Dukovany (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32569 (INIS-mf—7533) **Flow-cytometric examinations on bone marrow and spleen of the rat after whole-body irradiation.** Fischer, B. (Muenchen Univ. (Germany, F.R.). Fakultaet fuer Medizin). 11 Mar 1980. 50p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83780442.

Thesis.

Rats (body weight 100 g) underwent whole-body irradiation with 500 rad. From the 1st until the 30th day after irradiation bone marrow, spleen and peripheral blood were taken to produce from these tissues single cell suspensions. By means of fast flowmeters these specimen were investigated with regards to volume and DNA content and the results were analysed by different computer programs. It was revealed that the drastic reduction of the haematopoetic cells in spleen and bone marrow, which is due to the radiogenic exposure, is followed by two or three proliferation episodes

with differing intensity and temporal progress. After irradiation a cell population remained in the region of the small lymphocytes and normoblasts. The first repopulation phase is started by this population between the 3rd and 7th day; the second repopulation phase in the bone marrow between the 11th and the 17th day coincides with the occurrence of a discrete macrocytary erythrocyte population in the peripheral blood. Most probably the mammalian organism restores after a sublethal radiogenic lesion the normal haematopoetic conditions in spleen and bone marrow, not only by means of shortening the cellular cycle, but also by increasing the recruitment from the stem cell compartment into the differentiation compartments. The shortening of the total cellular cycle period concerns apparantly all cellular cycle phases, because no quantitative shifting of the parts of the individual cycle phases takes place. The early proliferation episode concerning the population of the small lymphocytes, normoblasts and also of the stem cells, seems to be of essential significance for the increased recruitment.

32570 (INIS-mf—7545, pp vp) **Influence of dose fractionation and dose rate on normal tissue responses.** Barendsen, G.W. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

An analysis of responses of a variety of normal tissues in animals to fractionated irradiations has been made with the aim of developing a formalism for the prediction of tolerance doses as a function of the dose per fraction and the overall treatment time. An important feature of the formalism is that it is directly based on radiological insights and therefore provides a logical concept to account for the diversity of tissue responses.

32571 (INIS-mf—7545, pp vp) **In vitro responses of R-1 and RUC-2 tumour cells to multiple dose fractionation and low dose rate irradiation.** van Rongen, E.; Kal, H.B. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

The experiments presented are part of a program in which the effectiveness of multiple daily fractionations and continuous irradiations at low dose rates on two tumour systems and on normal tissues have been investigated. Results of in vitro experiments with two tumour cell lines are presented. The efficacy of administering the total dose in multiple dose fractions or as continuous irradiation at a low dose rate as compared with acute single doses is evaluated. The two cell lines used were derived from a rat rhabdomyosarcoma, designated as R-1, and from a rat ureter carcinoma, coded as RUC-2. The fractions of surviving cells were determined by the colony formation assay after irradiations performed with ^{137}Cs gamma sources. Fraction doses of 2.56 and 3.39 Gy and time intervals of 1, 2 or 3 h were used. A continuous dose rate of 0.3 Gyh^{-1} was used. The results indicate that both fractionation and low dose rate irradiation are less effective than irradiation given as acute single doses. It is possible with both R-1 and RUC-2 cells to obtain the same survival level with the same dose given either with multiple dose fractionation or low dose rate irradiation.

32572 (INIS-mf—7545, pp vp) **Responses of four cell lines to continuous gamma irradiation applied at a dose rate of 0.1 Gy/h.** Welleweerd, J.; van Rongen, E. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

The effectiveness of continuous irradiation applied at an "ultra" low dose rate of 0.1 $Gy.h^{-1}$ was assessed in four cell lines (R-1, RUC-2, CH(V79) and Tg). This in vitro study was initiated because of the clinical interest in treating tumours by implanting ^{125}I seeds. The dose rates applied to human tumours with this technique are in the same order of magnitude as those in the experiments to be described here. The results indicate that the response of a cell population to irradiation applied at an ultra low dose rate depends on at least three parameters: cell cycle time, intrinsic radiosensitivity and dose rate. A relationship is presented enabling one to estimate the dose rate required to eliminate a cell population if the cell cycle time and initial slope of the survival curve are known.

32573 (INIS-mf—7545, pp vp) **Effect of misonidazole on the tolerance of the rat spinal cord to daily and multiple daily fractions of X rays.** van der Kogel, A.J.; Sissingh, H.A.; Kroese, J.A.M. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

Radiation damage in the spinal cord and brain is characterized by an occurrence in two waves with different time-dose-fractionation relationships and latent periods. Different target cells are assumed to be involved in the so-called early and late delayed damage. The objectives of the present study are to determine: 1) whether misonidazole changes either the early or late delayed response of the rat cervical spinal cord after single or fractionated doses of X rays; 2) whether hypoxia is induced in the spinal cord by anaesthesia; 3) whether multiple daily fractionation (MDF) reduces the spinal cord tolerance as compared with daily fractionation and what is the effect of daily administration of misonidazole. The results indicate that objectives 1 and 2 are not confirmed whereas objective 3 is. Misonidazole does not modify the early or late delayed radiation response of the rat cervical spinal cord. Hypoxia is not induced in the spinal cord by Nembutal or Ethrane anaesthesia. Multiple daily fractionation reduces the spinal cord tolerance, but the reduction in repair appears to be less with decreasing doses per fraction.

32574 (INIS-mf—7545, pp vp) **Fractionated total body irradiation; the gastrointestinal toxicity versus the conditioning effect for bone marrow transplantation with different fractionation schedules.** Walma, E.P.; Klapwijk, W.M.; Miller, A.M. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

In most cases, bone marrow transplantation is preceded by a conditioning regimen employing irradiation and/or cytotoxic drugs. The authors are searching for better fractionation schedules in order to optimize the conditioning regimen prior to transplantation of stem-cell-enriched bone marrow. They have determined damage to the gastrointestinal tract in dogs and mice after total body irradiation following a number of fractionation schedules, and these results are presented. The schedules were chosen such as to minimize the interval between irradiation and the bone marrow transplantation and to maximize clinical feasibility.

32575 (INIS-mf—7545, pp vp) **Neoplasia in rhesus monkeys irradiated with X rays and fission neutrons.** van Zwieten, M.J.; Hollander, C.F. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Inst. voor Experimentele Gerontologie); Broerse, J.J. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01. (CONF-8010311—Absts.).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

For more than 18 years, a study of the longevity and late radiation effects in rhesus monkeys (Macaca mulatta) has been in progress at the REP-Institutes. The monkeys in this study were irradiated with either X rays or fission neutrons and transplanted with autologous bone marrow as part of a study on early radiation effects. The long-term survivors from that study included twenty monkeys irradiated with X rays and nine irradiated with fission neutrons. A brief summary of the neoplastic lesions in these animals is presented here. Data on radiation doses, survival times, tumour incidence and latency periods and a list of the malignant neoplasms observed up to the present are given.

32576 (INIS-mf—7545, pp vp) **Experimental mammary radiation carcinogenesis at the tissue level.** Di Majo, V.; Nooteboom, A.L.; Ham, B.M. van; van Zwieten, M.J. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Inst. voor Experimentele Gerontologie); Broerse, J.J. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

This article reports on a study to evaluate the histological changes in a sample of mammary tissue irradiated in vivo with radiations of different LET and grafted to an ectopic site (dorsum) of an isogenic recipient. Two types of recipient animal were utilized: one with an artificially elevated plasma oestrogen level and a second with a normal hormonal status. Irradiations were performed with 1 and 2 Gy 15 MeV neutrons and 4 and 8 Gy 300 kV X rays. Inguinal mammary glands from whole-body irradiated 6 to 8-week-old female Sprague-Dawley rats were transplanted into an isogenic recipient. On the whole, the study shows that the technique of in vivo irradiation and subsequent transplantation of mammary gland tissue to an ectopic site is successful and reproducible.

32577 (INIS-mf—7545, pp vp) **Role of prothymocytes in radiation induced thymic lymphoma.** van Bekkum, D.W.; Knaan, S. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO); Boersma, W.J.A. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Inst. voor Experimentele Gerontologie). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

The authors report a marked decrease in the prothymocyte/HSC ratio in the bone marrow of mice after four weekly fractionated radiation exposures which is similar to that observed in regenerating bone marrow following transplantation. Experimental results indicate that the actual efficiency of regenerating bone marrow in the prevention of leukaemia may quite possibly be much less than one-third of that of normal bone marrow. Present data seem to support the idea that the prothymocyte is the effective cell type responsible for the protection against leukaemogenesis.

32578 (INIS-mf—7550, pp vp) **Low-level radiation hazard - a radiobiological prediction.** Waligorski, M. (Institute of Nuclear Physics, Krakow (Poland)). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32579 (INIS-mf—7553) **Study of the effects of a ^{60}Co-irradiation on the hatchability of chicken eggs.** Mueller-Buder, A. (Tieraerztliche Hochschule Hannover (Germany, F.R.)). 1981. 73p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83780443.

Thesis.

About 33.530 fertilized eggs of very uniform quality, from breeder flocks of different pedigree were tested for their hatchability. Before putting them into the incubator, the experimental groups were irradiated from a ^{60}Co-gamma-source. To ensure dose uniformity, a ^{60}Co-point-source was placed at the centre of a hemispherical hood, carrying more than 1000 eggs, all equidistant from the source. Doses tested were 1,29 to 4,64 x 10^{-3} C/kg. By using thermoluminescence-dosimeters, a precise dosimetry could be performed. A presumable increase of hatchability of the eggs, as reported in the literature, could not be found after applying a statistical analysis. However a tendency of a small positive irradiation-effect was observed in some groups of irradiated eggs. In few cases a statistically significant decrease of hatchability was obvious.

32580 (KFK—3385) **Subcellular distribution of ^{239}Pu, ^{241}Am and ^{59}Fe in the liver of rat and Chinese hamster as dependent on time.** Suetterlin, U. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Genetik und Toxikologie von Spaltstoffen). Oct 1982. 126p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750380.

Thesis. Submitted to Karlsruhe Univ. (TH) (Germany, F.R.).

The subcellular distribution of monomeric ^{239}Pu, ^{241}Am and iron in rat and Chinese hamster liver has been investigated by sucrose-, metrizamide- and Percoll-density gradients. In rat liver, the transuranium elements become and remain bound to typical lysosomes primary storage organelle in Chinese hamster liver. However, their apparent density in sucrose decreases with time, which possible indicates transition into telolysomes. The transuranium nuclides show a subcellular distribution which is quite different from that of iron.

32581 (LA—9479-PR, pp 21-26) **Tumorigenesis in the lung.** Smith, D.M.; London, J.E.; Drake, G.A.; Prine, J.R.; Valdez, Y.E.; Vigil, E.; Cunningham, J.J. Oct 1982. NTIS, PC A08/MF A01.

In Los Alamos Life Sciences Division's biomedical and environmental research programs. Progress report, January-December 1981.

Intravenous injections of ZrO_2 microspheres containing $^{238}PuO_2$ or $^{239}PuO_2$ in Syrian hamsters induced lung tumors independent of the number of microperes or total lung burden unless greater than 20% of the lung is irradiated. Delineation of the role of enhancing agents in radiation-induced lung carcinogenesis, examination of radionuclide matrix effects on carcinogenesis, determination of combined alpha- and beta-radiation effects, and establishments of underlying mechanisms during tumor development were conducted. (DLS)

32582 (OEFZS—4168) **Whole body autoradiography with mice using 14C-thymidine.** Hruby, R. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna). Jun 1982. 7p. (In German). (BL—390/82). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700318.

Whole body autoradiography was performed using common histology equipment. Results were useful with some restrictions. ^{14}C-thymidine and/or its metabolites were found in those tissues with high rate of mitosis.

32583 (PNL-SA—11069) **Tumorigenic and tumoricidal actions of ionizing radiations.** Sanders, C.L.; Kathren, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 471p. NTIS, PC A20/MF A01. Order Number DE83011219.

The book is divided into two approximately equal parts. The first four chapters are relatively lengthy and cover the basic principles of radiation biology, carcinogenesis and therapy, along with a brief introduction to radiological physics to orient the reader without background in this specialized related discipline. The remainder consists of twenty-four relatively brief chapters, each covering the radiation biology of a specific organ, tissue, or systems tissues, with emphasis on the tumorigenic and tumoricidal action of ionizing radiations.

32584 (UCRL—88350) **Analysis of mammalian-cell mutagenesis and DNA repair using in-vitro selected CHO cell mutants.** Thompson, L.H.; Carrano, A.V. (Lawrence Livermore National Lab., CA (USA)). 7 Apr 1983. Contract W-7405-ENG-48. 21p. (CONF-830440—1). NTIS, PC A02/MF A01. Order Number DE83010368.

From UCLA symposia on molecular and cellular biology; Keystone, CO, USA (10 Apr 1983).

In the Chinese hamster ovary (CHO) cell line, mutants that have defects in DNA repair processes were isolated. One class of mutants was obtained on the basis of hypersensitivity to killing by far uv radiation and is comprised of 5 genetic complementation groups. Mutants from each group have similar uv sensitivity as measured by killing and mutation induction, show $<$ 10% of the normal level of DNA incision after uv exposure, and exhibit hypersensitivity to chemicals that form bulky DNA adducts. These properties resemble those of cells from xeroderma pigmentosum (XP) patients. However, mutants from two of the CHO complementation groups are extremely sensitive to killing by DNA cross-linking agents, a property commonly associated with Fanconi's anemia rather than XP. Conditions have been devised to test for genetic complementation between the cross-link-sensitive CHO mutants and human diploid fibroblasts. A second class of CHO mutants (represented by strain EM9) appears to differ from the cellular phenotypes of human genetic diseases that affect repair. The properties of this mutant include: (1) greatly elevated (12-fold) baseline frequency of sister-chromatid exchange, (2) delayed rejoining of DNA strand breaks after x rays or simple alkylation damage, and (3) increased sensitivity to killing by DNA strand-breaking agents.

32585 **Effects of glycerol upon the biological actions of near-ultraviolet light: spectra and concentration dependence for transforming DNA and for Escherichia coli B/r.** Peak, J.G.; Peak, M.J. (Argonne National Lab., IL (USA)); Foote, C.S. (California Univ., Los Angeles (USA). Dept. of Chemistry). *Photochemistry and Photobiology;* **36**: No. 4, 413-416(Oct 1982).

The concentration dependence for the protection of isolated transforming DNA and Escherichia coli by glycerol against 365-nm monochromatic near-ultraviolet light (UV) was measured. Glycerol protection saturates at a concentration of about 0.1 M for DNA and 1.0 M for E. coli. Action spectra for glycerol protection of transforming DNA (tryptophan and histidine markers) are similar to those obtained previously for diazobicyclo[2.2.2.]octane (DABCO) protection, with protection reaching a maximum near 350-nm UV and decreasing rapidly at wavelengths above and below 350 nm. However, glycerol protects against near-UV about twice as efficiently as DABCO. The action spectrum for protection of E. coli by glycerol against the lethal effects of near-UV was not the same as the spectrum for DNA since glycerol sensitized the cells, but not the DNA, at wavelengths longer than about 380 nm. A possible role of hydroxyl or other radicals was supported by the observation that benzoate also protected DNA against inactivation by 334-nm UV.

32586 **Gamma-radiation treatment plant for the inactivation of bacteria and viruses in bio-effluent.** Fraser, F.M.; McKinnon, R.G.; Ouwerkerk, T. (Atomic Energy of Canada Ltd., Ottawa, Ontario. Commercial Products). pp 275 of Industrial application of radioisotopes and radiation technology. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-CN—40/84P; CONF-8109134—).

From International conference on industrial application of radioisotopes and radiation technology; Grenoble, France (28 Sep 1981).

Abstract only.

32587 **Repair capability and the cellular age response for killing and mutation induction after UV.** Wood, R.D.; Burki, H.J. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.; California Univ., Berkeley (USA). Graduate Group in Biophysics). *Mutation Research;* **95**: 505-514(1982).

The cell-cycle response for killing and mutation induction by ultraviolet irradiation was measured in synchronous Chinese hamster ovary cells (CHO wild-type) and in a UV-hypersensitive mutant (43-3B) derived from this line. The CHO 43-3B line shows a greatly enhanced sensitivity to killing (D_0 of 0.3 as compared to 3.2 J/m^2 for the wild-type), is hypermutable, and deficient in DNA repair. For the wild-type, a characteristic age response is seen for killing by UV, with maximum sensitivity in early-S and resistance increasing through the S-phase. There is also a life-cycle specificity for induction of diphtheria-toxin resistance in late-G_1 and early-S. Relatively little variation is seen through the cell cycle for induced 6-thioguanine and ouabain resistance. In contrast, the 43-3B cell line shows a relatively 'flat' response to UV throughout the cell cycle, for both killing and mutation induction. Therefore it appears that the characteristic age responses seen in the wild-type CHO are associated with the function of an essentially error-free repair process.

32588 **Characterization of a UV-resistant mutant of CHO-K1 with normal repair activity.** Newman, C.N. (Battelle Pacific Northwest Labs., Richland, WA (USA)). *Mutation Research;* **96**: 99-108(1982).

The biological and repair responses of Mut 8-16, an ultraviolet radiation (UV)-resistant derivative of CHO-K1, were characterized with respect to UV and to the active chemical carcinogen, benzo[α]pyrene-4,5-oxide. In comparison to the parent, the UV-survival response curve of this mutant showed a significantly larger shoulder but little or no difference in the slope of the exponential survival region. In addition, the mutant cell line demonstrated significantly larger mutation frequencies at high survival UV fluences, but smaller mutation frequencies at high survival equitoxic concentrations of the carcinogen benzo[α]pyrene-4,5-epoxide relative to the parent cell. However, these relative differences in mutation frequencies between parent and mutant appeared to decrease as survival decreased. Despite these observations there were no measurable differences in excision-repair, or in post-replication repair although the mutant appeared to show a nominal reduction (not an enhancement) of replication-repair activity following the UV exposure.

32589 **Assessment of health risks from exposure to ionizing radiation.** Beebe, G.W. (National Cancer Inst., Bethesda, MD). pp 3-21 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

Rapid development in the assessment of health risks from exposure to ionizing radiation has produced an impressive array of risk differentials of presumed biologic significance. In the human data these differentials involve: (1) the variety of cancer, especially its size; (2) host factors, especially age; (3) time following exposure; (4) magnitude of dose; and (5) type of radiation. From experimental work we may presume that dose-rate also plays a role, especially for sparsely ionizing radiation. Current research is extending the scope of differentials with respect to these and other variables, including cell type and concomitant environmental risk factors, and testing dose-response models suggested by experimental and theoretical work. As facts to be explained, differentials in risk may lead to hypotheses to be explored experimentally and improve our understanding of how ionizing radiation causes cancer. 74 references.

32590 **Statistical issues arising in the analysis of A-bomb survivor data.** Prentice, R.L. (Fred Hutchinson Cancer Research Center, Seattle, WA). pp 22-38 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

The following statistical topics are discussed in relation to A-bomb survivor cohort studies: (1) the use of sequence of covariate measurements in the study of disease risk factors, (2) the development of methods to examine risk factor interactions, with particular emphasis of additive and multiplicative relative risk models, (3) the accommodation of covariate measurement errors in relative risk estimation, and (4) the accommodation of extra-binomial variation in the regression analysis of count data. Topics (1)-(3) will be addressed using the framework of the Cox regression model. In respect to topic (4), only the need for regression model development and some possible approaches are described here. Specific illustrations are provided by blood pressure measurements and cardiovascular disease incidence (topic 1); cigarette smoking and radiation exposure in relation to cancer mortality (topic 2); thyroid cancer dose-response and radiation dose estimation errors (topic 3); and chromosome aberration rates and radiation exposure (topic 4).

32591 **Analyzing occupational cohort data: application to US uranium miners.** Whittemore, A.S.; McMillan, A. (Stanford Univ., CA). pp 65-81 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

This paper presents methodological issues concerning the analysis of occupational mortality data. It summarizes pros and cons of three types of analysis: the person-years method, the cohort method, and the case-control method, and notes the common theoretical basis underlying cohort and case-control methods. Both these methods assume that occupational exposures act multiplicatively on either: (a) age-specific mortality rates; or (b) odds-ratios of death during follow-up. Both methods allow relative risk estimation by maximizing a partial or conditional likelihood under assumption (a), and an unconditional likelihood under assumption (b). the case-control method involves less data handling and computation than does the cohort method. This feature, useful when dealing with very large cohorts whose exposures vary with time, is purchased at the price of some decreased sensitivity to detect moderate to large

relative risks associated with infrequently occurring exposure categories. The paper illustrates the utility and limitations of the case-control approach by applying it to lung cancer mortality versus exposures to radon-daughters and cigarette smoke among US uranium miners.

32592 **Partitioning measures of homogeneity in the Hanford mortality study.** Tolley, H.D. (Pacific Northwest Lab., Richland, WA). pp 82-93 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—). Contract AC06-76RL01830.

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

In occupational follow-up studies, one is often interested in measuring the association between a disease, or death, and a factor such as exposure. When the data can be placed in a set of two-way contingency tables, a common method of assessing such association is to use a Mantel-Haenszel or log-odds ratio type of procedure. These methods combine information over several two-way tables to get an overall measure of association but require homogeneity across the tables. When this assumption is not satisfied, the measure of association is difficult to interpret and usually homogeneous subsets of tables must be determined. In this paper, the use of linear models methods in partitioning data into homogeneous subsets is illustrated using the hanford follow-up study of nuclear workers. The methods illustrated using the Hanford follow-up study of nuclear workers. The methods illustrated are readily implementable using common statistical computer routines.

32593 **Risk assessment in populations screened for cancer.** Walter, S.D. (McMaster Univ., Ontario); Day, N.E. pp 137-153 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

Expressions are derived for the anticipated prevalence of pre-clinical chronic disease in a population which is screened several times, and for the anticipated incidence of clinical disease during the inter-screening intervals. Using these expressions in conjunction with data routinely available from screening programs, one may estimate: the distribution of the duration of the preclinical disease phase, the distribution of lead times of prevalent cases of disease identified by the screen; the program lead time distribution; the screening sensitivity; and the underlying incidence rate in the population. Predictions may also be made of the risk of disease occurring in a given interval following any particular sequence of screening times, thus allowing alternative screening strategies to be considered. The survival experience of prevalent and incident cases may be compared, adjusting for lead time and length-biased sampling effects. An example is given using data from a breast cancer screening program.

32594 **Case-control analysis of breast cancer in a screened population: implications for the assessment of environmental exposure risk factors.** Dubin, N.; Pasternack, B.S. (New York Univ. Medical Center, New York). pp 154-172 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

The appropriateness of using epidemiologic data from screened populations is investigated. Particular emphasis is given to design advantages and disadvantages of case-control studies using such data, statistical issues that arise in their analysis, and implications for testing hypotheses concerning environmental exposures. Concepts and techniques are illustrated with a recently completed study of breast cancer among screenees. Adjustment of odds ratios for number of screenings, symptomticity and year of first screening was necessary to avoid bias. When case subgroups are compared by classical methods, it should be done directly, rather than indirectly to controls, otherwise spurious trends may appear that are the result of the choice of baseline exposure group rather than risk differences. The multiple logistic model was used to adjust for many factors simultaneously and to model interaction between study factors. It is shown how careful interpretation of logistic regression parameters enables one to design a unified test to compare case subgroups simultaneously to one another and to controls and to test for initiation and promotion of cancer by environmental risk factors.

32595 **Radioecology and radiation protection.** Huber, O. (Bundesgesundheitsamt, Nauherberg (Germany, F.R.). Inst. fuer Strahlenhygiene). Berlin, Germany, F.R.; Fortbildungszentrum Gesundheits- und Umweltschutz (1981). 208p. (In German). (CONF-8105192—).

From 48. FGU seminar on radioecology and radiation protection; Berlin, F.R. Germany (20 May 1981).

The consideration of sensitivity gives the valence or significancy of the parameter axioms, environmental exposure pathways, and nuclides within the structure of the total mode of calculation.

32596 **Fast kinetics of the action of ionizing radiation in bacteria.** Harrop, H.A. London, England; London Univ. (1980). 249p.

Thesis.

The application of a fast-mixing and irradiation method, the gas explosion technique, to observe processes involved in the action of ionising radiation on bacteria is described. The decay of oxygen-dependent damage appears to be consistent with competition between chemical repair and fixation of radiation-induced lesions.

32597 **Investigations on proliferation kinetics and irradiation sensitivity of the perinatal sexual cells of the Wistar rat.** Hilscher, W.M. Muenchen, Germany, F.R.; Muenchen Univ. (1980). 137p. (In German).

Thesis.

Within this study it was investigated if T_1 prospermatogonia, a particularly longliving sexual cell type, have a differing irradiation sensitivity in different phases of their development. The first test group served to determine the date when the T_1 prospermatogonia terminate their long G_1 phase and when they live through the S, G_2 and M phases; the second animal group served to determine the duration of phase S and phase G_2; the 3. one served to determine the irradiation effect on the T_1 prospermatogonia, which depends upon dose and the date of irradiation; the 4. group served to investigate the kinetics of spermatogenesis between the 31. and the 47. day of life after irradiation on the 21. day after conception. It resulted that the 1. T_1 prospermatogonia enter on about the morning of the 4. day of life into phase S and that they live through this phase in 2 waves with maxima on the 4. and 5. postnatal day, in each case after about 20 hours. On the average phase S lasted 10 hours, phase G_2 4 hours. With increasing age the sexual cells became increasingly irradiation resistant. The varying degree of irradiation sensitivity was attributed to cell-cycle dependent sensitivity fluctuations and an enzyme pattern ripening with increasing age. An obviously dose-dependent inhibition of spermatogenesis between the 31. and the 47. postnatal days was found. It is supposed that this inhibition is due to a prolongation of the generation time of the X-radiated cells, to a damage of the genetic material with cell destructions and prolongation of generation times in the subsequent generations, and due to a delay of spermatogenesis.

5602 Thermal Effects

REFER ALSO TO CITATION(S) 32547

5603 Chemicals Metabolism And Toxicity

REFER ALSO TO CITATION(S) 32511, 32517

32598 (BNL—30750) Estimating public-health risks of air pollution at the national level. Rowe, M.D. (National Center for Analysis of Energy Systems, Upton, NY (USA)). Dec 1981. Contract AC02-76CH00016. 15p. (CONF-811236—4; CONF-811159—4). NTIS, PC A02/MF A01. Order Number DE83010850.

From Workshop on assessing health impacts of energy technologies at the regional or national levels; Upton, NY, USA (7 Dec 1981).

Public health risks of air pollution from energy production are highly location specific, but estimates of future emissions from such sources are often not location specific. This paper presents a method for estimating health risks from future emissions sources when estimates of locations of sources are not available. The method is based on results of complex, location-specific computer simulations of long-range transport and transformation of pollution emissions. These results are generalized to the national or regional level as probability distributions of exposures or health risks. Details are shown for long-range transport of non-sulfate respirable particles from coal-fired power plants and residential coal furnaces.

32599 (CONF-8203110—) Workshop on sublethal effects of stress on marine organisms. Martin, M.; Harrison, F. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 81p. NTIS, PC A05/MF A01. Order Number DE83009175.

From Workshop on sublethal effect of stress on marine organisms; Pacific Grove, CA, USA (30 Mar 1982).

The objectives of the workshop were to (1) summarize the state of the art in sublethal biological effects studies, (2) determine the relationships or interactions between organismal- and cellular- and molecular-level studies, (3) discuss the strengths and weaknesses of current studies, and (4) define new or needed research directions. Four major topics were considered: (1) sublethal effects of stress at the organismal level; (2) measuring response to sublethal stress at the organismal level; (3) sublethal effects of stress at the cellular and molecular level; and (4) measuring sublethal response to stress at the cellular and molecular level. Introductory statements, subcommittee reports, keynote address, and abstracts of presentation are presented.

32600 (DOE/EV/05593—3) Effect of petroleum-related pollutants on Aurelia growth and development. Final progress report, September 12, 1977-August 31, 1982. Spangenberg, D.B. (Eastern Virginia Medical School, Norfolk (USA)). 1982. Contract AS05-77EV05593. 28p. NTIS, PC A03/MF A01. Order Number DE83009455.

Petroleum-related hydrocarbons were tested using the Aurelia Metamorphosis Test System. In addition, extensive studies were made of the effects of Alaskan crude petroleum oil, cadmium, and sodium azide on Aurelia metamorphosis. The Aurelia Budding Test System was applied to phenol, aniline, and naphthalene and the Aurelia Genetic Modification Test System was developed to determine whether chemically-treated organisms had genetic damage which could be revealed in progeny over a long period of time. The Aurelia Genetic Modification Test System was applied to aniline, phenol, Alaskan crude petroleum oil, and sodium azide-treated organisms. It is concluded that the Aurelia can be used effectively to ferret out subtle effects of marine pollutants as well as far-reaching effects passed on through progeny over a long period of time. Pollutant effects are most rapidly revealed, however, in organisms undergoing metamorphosis especially with regard to effects related to iodine metabolism, calcium metabolism, and behavioral and morphological teratology. The premise is that specific effects of environmental pollutants must be known in order that these effects may be neutralized or prevented. Through an understanding of mechanisms of action of various pollutant components in simple indicator organisms such as Aurelia, it may ultimately be possible to maintain high standards of energy production and to have a safe and productive marine environment at the same time.

32601 (DOE/NBM—3009488) Binding sites associated with inhibition of photosystem II. Shipman, L.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83009488.

A variety of experimental and theoretical evidence has been integrated into coherent molecular mechanisms for the action of photosystem II herbicides. Photosystem II herbicides act by inhibiting electron transfers between the first and second plastoquinones on the reducing side of photosystem II. Each herbicide molecule must have a flat polar component with hydrophobic substituents to be active. The hydrophobic substituents serve to partition the molecule into lipid regions of the cell and to fit the hydrophobic region of the herbicide binding site. The flat polar portion of the herbicide is used for electrostatic binding to the polar region of the herbicide binding site. Theoretical calculations have been carried out to investigate the binding of herbicides to model proteinaceous binding sites.

32602 (EPA—600/9-80-057a, pp 538-556) Effect of diesel particulate exposure on adenylate and guanylate cyclase of rat and guinea pig liver and lung. Schneider, D.R.; Felt, B.T. (Wayne State Univ., Detroit, MI). Nov 1980. Health Effects Research Lab., Office of Research and Development, US Environmental Protection Agency, Cincinnati, OH 45268. (CONF-791260—Vol.1).

From Symposium of health effects of diesel engine emission; Cincinnati, OH, USA (3 Dec 1979).

Rats and guinea pigs were exposed to 250 or 1500 $\mu g/m^3$ diesel particulate for 24 weeks at the General Motors Research Laboratories. To determine the possibility of a tumor response from this exposure, we measured adenylate and guanylate cyclase activity of the liver and lung in these and control tissues. Although we found substantial qualitative differences throughout the 24 week period examined, we detected no changes in the basal activity of either enzyme system. Adenylate cyclase activity remains stimulatible from the liver and lung tissues of each species. Guanylate cyclase activity of the liver also remained stimulatible. On these findings, a tissue tumor response to these exposures was not supported. Age related changes were observed in the lung tissues of each species, and guanylate cyclase activity was decreased in this tissue after diesel exposure.

32603 (LA—9479-PR) Los Alamos Life Sciences Division's biomedical and environmental research programs. Progress report, January-December 1981. Holland, L.M.; Stafford, C.G. (comps.). (Los Alamos National Lab., NM (USA)). Oct 1982. Contract W-7405-ENG-36. 158p. NTIS, PC A08/MF A01. Order Number DE83003889.

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This report summarizes research and development activities of the Los Alamos Life Sciences Division's Biomedical and Environmental Research program for the calendar year 1981. Individual reports describing the current status of projects have been entered individually into the data base.

32604 (NP—3901173) Effects of ozone and cadmium on the CO_2 assimilation and transpiration of Nicotiana tabacum L. and Phaseolus vulgaris L. Faensen-Thiebes, A. (Technische Univ. Berlin (Germany, F.R.). Fachbereich Landschaftsentwicklung). 9 Dec 1981. 106p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901173.

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Cadmium was administered via the soil and/or the nutrient solution. CO_2-assimilation and transpiration and the visible damage, the growth and the chlorophyll content are described. Gas exchange of both species is considerably reduced by ozone. It causes characteristic leaf necrosis and in addition a brown coloration in Phaseolus and reduced growth in Nicotiana. Direct influence of ozone on the chlorophyll content could not be found. When 10 and 50 ppm of cadmium are added to the soil the photosynthesis was reduced. 100 ppb of cadmium however, administered in the nutrient solution stimulated the photosynthesis of Phaseolus. Cadmium influenced neither growth nor chlorophyll content of either species. The amount of uptake in cadmium varied strongly but was always higher in Nicotiana. Combination of both noxious substances was characterized by the Cadmium property to prevent damage by high ozone concentration, cadmium-concentration in the plants however had reached the toxical range for human beings and phytophagous

animals. On the basis of the test results and the literature a hypothesis is established on the mechanism of effects of ozone in the plant and the mechanism of resistance.

32605 **(NP—3901191) Lead in the environment and its effects on man.** Worthoff, E. (Technische Hochschule Aachen (Germany, F.R.). Medizinische Fakultaet). 19 Aug 1980. 110p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901191.

Portions are illegible in microfiche products; Thesis.

Three examinations were carried out in sequence on persons from one at-risk area who were not professionally exposed to lead. The results were compared. It could be shown that the values for the individual parameters, indicating initially high risks for the entire population, were improved to values up to normal after the lead-processing plant had taken measures to reduce emission. It is the aim of this investigation to help set up uniform evaluation criteria for the harmful effect of lead on man. In this sense some incidences of mutual dependence between the individual parameters and dependence on other factors of epidemiology are pointed out.

32606 **(ORNL/EIS—202) Problem definition study on the health effects of diethyleneglycol dinitrate, triethyleneglycol dinitrate, and trimethylolethane trinitrate and their respective combustion products. Final report.** Holleman, J.W.; Ross, R.H.; Carroll, J.W. (Oak Ridge National Lab., TN (USA); Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD (USA)). Apr 1983. Contract W-7405-ENG-26. 94p. NTIS, PC A05/MF A01. Order Number DE83011068.

This report is an evaluation of the available literature on the health effects and toxicity of three nitrate esters, diethyleneglycol dinitrate (DEGDN), triethyleneglycol dinitrate (TEGDN), and trimethylolethane trinitrate (TMETN) and their respective combustion products. Information on the combustion products of munitions containing these three nitrate esters was nonexistent but some data was available on the products of combustion of munitions in general. Toxicologic and health effects literature dealing directly with DEGDN, TEGDN, and TMETN was very sparse and accordingly an evaluation of the toxicology of other nitrate esters used in the explosives industry is presented, along with recommendations for future medical research to develop the necessary scientific data base to recommend occupational health and environmental quality protection criteria for these compounds in their production, use, and disposal.

32607 **Mutagenicity of diesel exhaust particle extracts: influence of fuel composition in two diesel engines.** Clark, C.R. (Lovelace Inhalation Toxicology Research Inst., Albuquerque, NM); Henderson, T.R.; Royer, R.E.; Brooks, A.L.; McClellan, R.O.; Marshall, W.F.; Naman, T.M. *Fundamental and Applied Toxicology;* 2: 38-43(Jan-Feb 1982).

The influence of diesel fuel composition on mutagenicity of exhaust particle associated organic compounds has been investigated using nine fuels varying in aromatic content and distillation properties. The tests were conducted with Oldsmobile Delta-88 and Peugot 504 diesel cars operated according to the EPA Federal Test Procedure. The particulate exhaust from each test was collected on a filter, extracted in dichloromethane and the resulting extract evaluated for mutagenicity in Salmonella strain TA-100. Mutagenicity of extracts of particles collected from the Oldsmobile were highest in the higher aromatic content fuels (> 30%) but similar for intermediate (20%) and low (13%) aromatic content fuels. No influence of aromaticity on mutagenicity was observed in samples collected from the Peugeot under the same conditions. Thus, fuel aromatic content may enhance the production of mutagenic combustion products at higher concentrations, but may be dependent upon engine type. A good correlation was observed between mutagenicity of the particle extracts and the initial boiling point of the fuel ($r = 0.89$). Gas chromatography/mass spectrometric analysis of the aromatic fraction of the fuels showed that the fuel producing the most mutagenic combustion products was highest in phenanthrene type compounds.

32608 **Metabolism of benzo(a)pyrene by human epithelial and fibroblastic cells: metabolite patterns and DNA adduct formation.** Bartley, J. (Peralta Cancer Research Inst., Oakland, CA); Bartholomew, J.C.; Stampfer, M.R. *Journal of Cellular Biochemistry;* 18: 135-148(1982). Contract W-7405-ENG-48.

It was demonstrated in cell culture that mammary epithelial cells from normal human breast specimens metabolize benzo(a)pyrene (BaP) and form adducts with the bases of their DNA more readily and at lower concentrations of BaP than do fibroblasts from the same specimens. BaP metabolism and adduct formation was determined in the same incubations with epithelial cells grown out in early passage from each of three specimens and with fibroblasts from one of these specimens. The metabolite pattern of the epithelial cells was indicative of preferential formation of 7, 8-dihydrodiol-9, 10-dihydroepoxybenzo(a)pyrene the ultimate carcinogen. In contrast, fibroblasts formed mainly mono- and dihydroxide derivatives of BaP. The metabolite pattern from epithelial cells was compatible with the ease in which adducts between DNA and the diolepoxide of benzo(a)pyrene were formed. These results provide evidence that chemical carcinogens should be considered as possible factors in the induction of breast cancer in women.

32609 **Environmental epidemiology: risk assessment.** Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). 233p. (CONF-8206169—). Contract FG02-82ER60042.

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

Papers presented at the symposium are in the disciplines of biometry, environmental medicine, epidemiology, mathematics, and statistics. Attention is given to assessing risk due to environmental agents, particularly those known to be carcinogenic; both the complex medical issues involved and the mathematical and statistical methodologies used in analysis are presented. Separate abstracts have been prepared for 15 papers for inclusion in the Energy Data Base. (RJC)

32610 **Epidemiologic studies of water quality and cancer in Iowa: methodologic issues and current findings.** Wallace, R.B.; Isacson, P.; Bean, J.A.; Lynch, C.; Woolson, R. (Univ. of Iowa, Iowa City). pp 39-48 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

A data base of water quality and treatment processes is being assembled from a variety of sources accumulating since the 1930's for the 941 municipalities of Iowa with public water systems. This data base is being analyzed with cancer incidence information obtained since 1969, as part of the Surveillance, Epidemiology and End Results program of the National Cancer Institute. Methodologic studies are underway which consider the impact of population mobility on risk ratios associated with environmental exposures, the assessment of actual water supply usage by cancer patients, the validity of water quality and treatment data and factors which modify risk ratios in aggregate epidemiologic studies. Initial analytic activities have explored associations between cancer incidence at various sites and water source (surface, wells and well depth), treatment practices (chlorination) and water constituents (trihalomethanes, other volatile organic compounds and other substances). Further refinements and verification of initial observations are underway. Reconciling these findings with other epidemiologic and cancer biology studies will be required before any associations discovered can be accepted.

32611 **Studying potential reproductive hazards.** Petitti, D.B. (Kaiser-Permanente Medical Care Program, Oakland, CA). pp 49-61 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

An increasing amount of concern about potential environmental and occupational hazards has focused on the possibility of their affecting reproduction: the ability to conceive, to carry a pregnancy to term, and to produce from the pregnancy a normal infant. In this paper, major problems encountered in the design of epidemiologic studies of the association of a potential hazard with a poor reproductive outcome are discussed in the context of a recent attempt to design and conduct a study of the reproductive effects of aerial spraying with malathion, a pesticide. The likely effect of failure to solve thee problems on a public policy decision to use or not to use the potential hazard when these considerations are based solely on health is discussed. Several possible study designs are presented and critiqued.

32612 **Approaches to epidemiologic analysis of prospective and retrospective studies: example of lung cancer and exposure to arsenic.** Brown, C.C.; Chu, K.C. (National Cancer Inst., Bethesda, MD). pp 94-106 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

Methods for epidemiologic analysis of prospective cohort and retrospective case-control studies of cancer are proposed. These methods are based on predictions of a multistage theory of carcinogenesis, and the results of their use allow an interpretation of whether carcinogenic exposure acts at an early and/or late stage of the presumed multistage process. Application of these methods to a study of mean occupationally exposed to arsenic indicates that the carcinogenic exposure appears to act at a late stage.

32613 **Regression models in ordered categorical data.** McLarty, J.W.; Fortson, N.G. (Univ. of Texas, Tyler). pp 122-134 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

Models for regression analysis of cytopathological data, in which the respone is an ordered categorical variable, are described and shown to be equivalent to the discrete proportional hazards models of Cox and Kalbfleisch and Prentice for failure time data. Extension of the models to provide goodness-of-fit tests and analyses of repeated measurements are described. It is shown that the models developed for cytopathological data can be generalized to arbitrary ordered categorical variables through an approach similar to that of McCullagh. Data on sputum testing were obtained for a cohort of 801 former asbestsos workers and 184 controls and analyzed using these models.

32614 **Risk assessment using vital data.** Moolgavkar, S.H. (Fox Chase Cancer Center, Philadelphia, PA). pp 175-192 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

Simple statistical models are described for the analysis of cancer incidence and mortality data. These models are used to study the association between cigarette smoking and mortality from cancers of the bladder, pancreas and lung in England and Wales. The data are consistent with the hypothesis that the differences between male and female rates in these cancers are attributable to differences in smoking habits. The observed increase in mortality in these diseases is almost entirely due to a dramatic increase among smokers. Moreover, the analysis reveals that the mortality rate among non-smokers increased slowly for carcinoma of the pancreas and actually fell for carcinoma of the bladder. For carcinoma of the lung, the rates rose gradually until 1956-1960 and then declined until 1971-1975. The beginning of the decline was coincidental with the passage of the Clean Air Act in Britain.

32615 **Logistic regression methods in risk assessment.** Anderson, J.A. (Fred Hutchinson Cancer Research Center, Seattle, WA). pp 205-215 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

A review is provided of a wide variety of logistic models for relating environmental risks and exposure histories. Prospective cohort and case-control studies are considered along with investigations involving k(≧ 2) disease states. Modifications of the logistic model are considered and estimation problems introduced for quite general models. Problems relating to ordered categorical variables, whether disease states or exposure histories, are discussed and some new approaches mentioned.

32616 **Alternatives to the proportional hazards model.** Farewell, V.T. (Fred Hutchinson Cancer Research Center, Seattle, WA). pp 216-229 of Environmental epidemiology: risk assessment. Prentice, R.L.; Whittemore, A.S. (eds.). Philadelphia, PA; Society for Industrial and Applied Mathematics (1982). (CONF-8206169—).

From SIMS conference - environmental epidemiology: risk assessment; Alta, UT, USA (28 Jun 1982).

In the context of two particular data sets, this paper examines alternatives to regression methodology based on hazard functions or conditional probability distributions. The use of mixture models which allow a fraction of long-term survivors is examined for the mortality data of fish in water with various concentrations of zinc. A study of anovulatory cycles in diabetic women is used to illustrate regression methodology emphasizing the marginal distribution of discrete time series observed in a panel study. The model assumes a Markov dependence in the time series.

5604 Other Environmental Pollutant Effects

REFER ALSO TO CITATION(S) 31603

32617 **(DOE/EV/03490—2250) Criteria for electric field bioeffects investigations and risk assessment.** Michaelson, S.M. (Rochester Univ., NY (USA). Dept. of Radiation Biology and Biophysics). 1983. Contract AC02-76EV03490. 20p. (CONF-830626—1). NTIS, PC A02/MF A01. Order Number DE83010193.

From IEEE/ESMO conference; Atlanta, GA, USA (9 Jun 1983).

Most of the research on biological effects of electric fields (EF) has been done with small rodents that have many physical and physiological attributes significantly different from those of man. In making extrapolations from animal data to man we must be particularly cognizant of the limitations and pitfalls in the use of animal experimentation data. Many factors must be considered in the design of experiments using organisms other than man as a test subject. These include the species, strain, sex, age of the animal, the methods of caring for the test animals, the animals' feeding patterns, the roles of seasonal and circadian rhythms, biological drifts, temperature and humidity. The reliability of laboratory studies using experimental animal models depends on the following considerations: (1) the selection of the animal model with consideration of its cognitive limits, (2) scaling factors associated with the nature of the field in the laboratory investigation of the biological processes using animal models, and (3) the methods by which the extrapolation of the data from the animal models relate to human studies.

57 HEALTH AND SAFETY

REFER ALSO TO CITATION(S) 32448

32618 **(AD-A—123471/5) A general mathematical treatment of hazards to NBC collective protection systems with applications to particular cases. Interim report.** Helmbold, R.L. (Naval Air Development Center, Warminster, PA (USA). Systems Directorate). 20 Sep 1982. 26p. NTIS, PC A03/MF A01.

This document presents a general mathematical development of the theory of vapor contamination hazards to nuclear, biological and chemical (NBC) collective protection systems. An important general result is derived and then illustrated by applying it to selected examples of special interest in studies of NBC defense. This work was performed under the Naval Aircraft Combat Survivability Program's Task F-82-11 Aircraft Protection/Decontamination Requirements for Naval Air Operations in a CBR Environment.

32619 **(BNL—30735) Health effects of residential wood-fuel use.** Morris, S.C. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 16p. (CONF-811159—5). NTIS, PC A02/MF A01. Order Number DE83010827.

From 109. annual meeting of the American Public Health Association; Los Angeles, CA, USA (1 Nov 1981).

The objective was to develop quantitative estimates of health effects of residential wood fuel use in the U.S. and provide some comparison with coal and oil alternatives. A fuel cycle approach was taken, estimating energy flows along a trajectory from extraction or harvesting to ultimate use. Nonquantified health risks are burns and indoor air pollution. For comparison, health effects were estimated in gathering, transport, and combustion stages of supplying space heat for 1 million dwelling years with wood, oil, and coal. This is 6×10^7 GJ heat or 8.8×10^7 GJ wood input at 68% efficiency. Oil and coal alternatives were scaled from earlier work.

32620 **(RHO-QA-VS—2P) Investigation of occupational illnesses at the 222-S building on December 8, 1982.** Louk, W.L.; Hevland, M.E.; Lilly, A.W.; Owens, G.C. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). Mar 1983. Contract AC06-77RL01030. 68p. NTIS, PC A04/MF A01. Order Number DE83011105.

On the afternoon of December 8, 1982, three Rockwell Chemical Technologists, B, D, and E, were transported to Kadlec Hospital with varying degrees of dermatitis and respiratory problems. One chemical technologist was held overnight and released to return to work on December 13, 1982. The other two were not released until December 16, 1982, and continuing ill effects have prevented their return to work. The chemical technologists' symptoms developed initially during a sodium fluoride repackaging operation in Room 4M of the 222-S Analytical Laboratory. The sodium fluoride was being repackaged from a 25-lb box of the material into 500-g quart ice cream cartons. The repackaging was done inside a chemical fume hood. The closed cartons were removed from the hood and sealed with tape on a laboratory bench. Procedurally, the final taping was to be done in the hood. Events and causal factors associated with the incident are summarized. It is concluded that extreme sensitivity of the three individuals to sodium fluoride probably caused the incident. The lack of procedural steps to minimize movement of sodium fluoride contamination from the hood probably led to increased sodium fluoride contamination in the room. This may have contributed to the reactions of the chemical technologists.

58 GEOSCIENCES

5801 Geology And Hydrology

REFER ALSO TO CITATION(S) 31124, 31187, 31235, 31239, 31240, 31273, 31290, 32674

32621 **(DOE/ET/46617—T3) Lithology, microstructures, fluid inclusions, and geochemistry of rock salt and of the cap-rock contact in Oakwood Dome, East Texas: significance for nuclear waste storage. Report of investigations No. 120.** Dix, O.R.; Jackson, M.P.A. (Texas Univ., Austin (USA). Bureau of Economic Geology). 1982. Contract AC97-80ET46617. 62p. NTIS, PC A04/MF A01. Order Number DE83011101.

Oakwood salt dome in Leon and Freestone Counties, Texas, has a core composed of a diapiric salt stock at a depth of 355 m. A vertical borehole in the center of the salt stock yielded 57.3 m of continuous rock-salt core overlain by 137 m of anhydrite-calcite cap rock. The lower 55.3 m of rock salt exhibits a strong, penetrative schistosity and parallel cleavage dipping at 30 to 40° and more than 60 variably dipping layers of disseminated anhydrite. Anhydrite constitutes 1.3 +- 0.7 percent of the rock-salt core. The upper 2 m of rock salt is unfoliated, comprising a lower 1.4-m interval of medium-grained granoblastic rock salt and an upper 0.6-m interval of coarse-grained granoblastic rock salt. An abrupt, cavity-free contact separates rock salt from laminated cap rock consisting of granoblastic-polygonal anhydrite virtually devoid of halite or pore space. Microstructures and concentration gradients of fluid inclusions suggest that the unfoliated rock salt at the crest of the salt stock was once strongly foliated, but that this fabric was destroyed by solid-state recrystallization. Downward movement of brine from the rock-salt - cap-rock contact was apparently accompanied by two recrystallization fronts. Dissolution of halite at the contact released disseminated anhydrite that presumably accumulated as sand on the floor of the dissolution cavity. Renewed rise of the salt stock closed the cavity, and the anhydrite sand was accreted against the base of the cap rock. Much, if not all, of the lamination in the 80 m of anhydrite cap rock may result from cycles of dissolution, recrystallization, and upward movement in the salt stock, followed by accretion of anhydrite residuum as laminae against the base of the cap rock. These processes, which are strongly influenced by fluids, act both to breach waste repositories and to geologically isolate them.

32622 (INIS-mf—7550, pp vp) **Adaptation of the Saclay van de Graaff tandem for carbon 14 dating.** Bertier, B.; Bianchi, L.; Delaunay, B. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Physique Nucleaire); Delibrias, G.; Koechlin, Y.; Poupeau, G. (Centre National de la Recherche Scientifique, 91 - Gif-sur-Yvette (France). Centre des Faibles Radioactivites). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32623 (INIS-mf—7550, pp vp) **Radiocarbon dating of Gdansk shipwreck by short- and long-lived organic materials: interpretation of results.** Pazdur, A.; Awsiuk, R.; Bluszcz, A.; Pazdur, M.F.; Walanus, A. (Politechnika Slaska, Gliwice (Poland). Inst. Fizyki). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32624 (INIS-mf—7550, pp vp) **Radiocarbon dating of soil organic matter fractions.** Pazdur, M.F.; Awsiuk, R.; Bluszcz, A.; Pazdur, A.; Walanus, A. (Politechnika Slaska, Gliwice (Poland). Inst. Fizyki). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32625 (INIS-mf—7550, pp vp) **Reporting of radiocarbon age measurements of very old samples.** Walanus, A.; Pazdur, M.F. (Politechnika Slaska, Gliwice (Poland). Inst. Fizyki). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32626 (INIS-mf—7550, pp vp) **Determination of very low sup(114m)InEDTA concentrations in water for hydrological applications.** Lebecka, J.; Tomza, I. (Central Mining Institute, Katowice (Poland)). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32627 (INIS-mf—7550, pp vp) **Measurements of cosmogenic ^{10}Be by accelerator spectrometry and its applications.** Raisbeck, G.M.; Yiou, F. (Paris-11 Univ., 91 - Orsay (France). Centre de Spectrometrie Nucleaire et de Spectrometrie de Masse). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32628 (INS-R—272) **Experiments to determine the efficiency of two standard decontamination procedures for radiocarbon samples.** Currie, D.R. (Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences). Feb 1980. 6p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700311.

Laboratory tests were made to decontaminate radiocarbon samples containing known amounts of contamination. Results for both acid-alkali treatment and acid hydrolysis indicate that decontamination is not 100% efficient.

32629 (NP—3901646) **Geologic map of Region G, North Carolina. Regional Geology Series 2.** Carpenter, P.A. III. (North Carolina Dept. of Natural Resources and Community Development, Raleigh (USA). Div. of Land Resources). 1982. 49p. North Carolina Dept. of Natural Resources and Community Development, Raleigh.

A geologic map is presented of Alamance, Caswell, Davidson, Guilford, Randolph, and Rockingham counties. Included is a supplement giving engineering and physical characteristics of soils and a correlation of topographic features and mineral resource uses. (ACR)

32630 (ONWI—457) **SWENT: a three-dimensional finite-difference code for the simulation of fluid, energy, and solute radionuclide transport. Technical report.** (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 321p. NTIS (US Sales Only), PC E12/MF A01. Order Number DE83011666.

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SWENT (Simulator for Water, Energy, and Nuclide Transport) simulates the transient, three-dimensional transport of fluid, energy, an inert component, and any number of radionuclides through a heterogeneous geologic medium. The first three processes are treated as coupled by the fluid properties, density, and viscosity. Aquifer porosity is treated as a function of pressure. The resulting system of nonlinear partial differential equations are solved by finite-difference approximations, suitable linearization schemes, and an iterative technique to minimize the error in linearization.

32631 (PTB-ATWD—18, pp 105-135) **Dating methods and their relevance in physics.** Schneider, H. Oct 1981. (In German). Fachinformationszentrum Energie, Physik, Mathematic, Karlsruhe, Germany, F.R. (CONF-8110232—).

From 37. PTB-seminar on structure and information in engineering and nature; Braunschweig, F.R. Germany (7 Oct 1981).

The article describes some of the most important radiometric clocks. It is pointed out how much the chronological interpretation of isotopic ratios depends on preconceived models about origin and history of investigated minerals. A number of physico-chemical effects are discussed, which give rise to fictitious datings. The possibility is considered that all the radiometric ages used for establishing the geologic time scale might be due to such effects. The history and foundations of the latter are reviewed, and the possibility of a wrong decision is mentioned. Several results from fossil objects indicate very young ages. The usual treatment of anomalous results is criticised. Long-time clocks fails to reproduce documented young ages. It is suggested that in the age interpretation of isotopic ratios much younger than conventional ages be also taken into consideration. The importance of directly dating fossils is stressed.

32632 (TAC-RS—82-004) **Remote sensing of natural resources. Quarterly literature review, fourth quarter, October-December 1982.** (New Mexico Univ., Albuquerque (USA). Technology Application Center). 1982. 212p. Univ. of New Mexico, Technology Application Center, Albuquerque.

This bibliography contains approximately 642 citations and/or abstracts. Subject areas covered are geology, environmental quality, hydrology, vegetation, oceanography, regional planning and land use, data manipulation, and instrumentation and technology. (ACR)

32633 (UCID—19785) **Stratigraphic contacts for drill holes at the Nevada Test Site.** Howard, N.W.; Bell, C.A. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 41p. NTIS, PC A03/MF A01. Order Number DE83012035.

This report lists all holes which have been drilled at the Nevada Test Site for which stratigraphic contacts have been measured or estimated, and entered into the LLNL Containment Program Test Effects and Geological Data Bank. No post shot holes and not many instrument holes are listed, because there is not much geologic information for them. Water wells and hydrologic test holes usually do have data, and all are listed. A list of the parameters is included. The stratigraphic contacts for holes drilled since BANEBERRY are probably correct to 1 or 2 m, subject to debate among individual geologists. The holes drilled before BANEBERRY (before much sidewall sampling and geophysical logging) are dependent on the geologist's ability to pick contacts from studying cuttings samples, which may have been contaminated or dog housed (a sample from one horizon put into multiple boxes).

32634 **Multidimensional numerical simulation of fluid flow in fractured porous media.** Narasimhan, T.N. (Lawrence Berkeley Lab., CA). *Water Resources Research;* **18**: No. 4, 1235-1247(Aug 1982). Contract W-7405-ENG-48.

Isothermal flow of water in a variety of fractured systems is discussed in the context of a unified, integral framework. Three commonly used conceptualizations, namely, porous systems, fractured systems, and composite porosity systems, are analyzed. The integral equations are directly replaced by discretized expressions based on an integral finite difference scheme (IFDM). Because of the manner in which the IFDM scheme chooses to handle geometric inputs, it handles the three aforesaid conceptualizations with equal facility. Six illustrative examples are provided to give an idea of the variety of fracture-related problems that are of common interest, to identify the common denominators that unify these problems and to demonstrate the power of the IFDM.

32635 **A stochastic-convective transport representation of dispersion in one-dimensional porous media systems.** Simmons, C.S. (Battelle Pacific Northwest Lab., Richland, WA). *Water Resources Research;* **18**: No. 4, 1193-1214(Aug 1982). Contract AC06-76RL01830.

A sochastic-convective transport formulation based upon solute travel time probability is presented and is shown to include Fickian transport as a special subcase. It is further demonstrated that a travel time probability associated with a lognormal distribution of hydraulic conductivity will yield concentration breakthrough curves nearly equivalent to those of Fickian transport when the coefficient of variation in travel time is sufficiently small, i.e., less than unity. When applied to column tracer experiments, the results suggest that typical laboratory-measured hydrodynamic dispersion may be ascribed to local variations in hydraulic conductivity. Moreover, stochastic-convective transport is shown to conserve solute mass under a flux boundary condition but to fail to do so under a held concentration condition. This result indicates the importance of boundary conditions for properly formulated stochastic transport. The travel time formulation is shown to provide a direct link between measured dispersivity and the autocovariance of local flow velocity variations that are a consequence of media inhomogeneity and the system boundary conditions. Dispersivity is shown to manifest a scale effect by incressing in proportion to the length of a system when the velocity correlation range is greater than that length. An expression for the effective dispersivity is de-

rived for the case of long-range velocity correlations and is shown to represent non-Fickian behavior.

5802 Geophysics

REFER ALSO TO CITATION(S) 31105, 31173, 31187, 31266, 31303, 32401

32636 (NUREG/CR—3117) Seismicity and tectonic relationships of the Nemaha Uplift and Midcontinent geophysical anomaly. Final project summary. Burchett, R.R.; Luza, K.V.; Van Eck, O.J.; Wilson, F.W. (Nebraska Univ., Lincoln (USA). Inst. of Agriculture and Natural Resources; Oklahoma Geological Survey, Norman (USA); Iowa Geological Survey, Iowa City (USA); Kansas Geological Survey, Lawrence (USA)). Feb 1983. 147p. NTIS, PC A07/MF A01. Order Number DE83901958.

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The geological surveys of Iowa, Nebraska, Kansas, and Oklahoma conducted a 4- to 6-year investigation of the seismicity and tectonic relationships of the Nemaha Uplift and associated geologic features in the Midcontinent. Regional geological, gravity, aeromagnetic, seismological, and topographic information were compiled on 1:1,000,000-scale base maps. The following maps were prepared: (1) relief, (2) earthquake epicenter and station location, (3) lineament, (4) geologic bedrock, (5) structure contour (base of Kansas City Group or older Pennsylvanian rock units), (6) Precambrian configuration, (7) Bouguer gravity anomaly, (8) aeromagnetic, and (9) Precambrian rock type. One correlation between earthquakes and tectonic structures was made. There appears to be recent as well as historical earthquake activity associated with the Humbolt Fault zone, southeastern Nebraska and northeastern Kansas.

5803 Mineralogy, Petrology, And Rock Mechanics

REFER ALSO TO CITATION(S) 31188, 31267, 31282, 31285, 31306

32637 (NP—3901278) Effects of rock anisotropy and non-linear material response to fracture on the findings of borehole stress measurements. Rahn, W. (Bochum Univ. (Germany, F.R.). Inst. fuer Geologie). Aug 1981. 221p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83901278.

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The most important in-situ stress measuring methods are presented in the first few chapters of this paper and their advantages and disadvantages are discussed in them. Moreover, the rock mass behaviour and the most significant constitutive laws underlying the theme are explained. The types and magnitudes of anisotropy of different rocks are demonstrated with the aid of examples and tables extracted from the literature. The main part of this work focusses on the following aims: 1. Demonstration of errors of in-situ stress calculations in anisotropic rocks arising from the assumption of material isotropy. 2. Procedures for the correction of errors in the above mentioned stress calculations. 3. Summary of the theoretical background to the most important stress measuring methods and description of their application. Thereby the following methods are considered: - The Doorstopper method, - Measuring techniques using triaxial strain measuring cells, - Measuring techniques using borehole deformation cells. Anisotropic stress concentration factors, essential for the application of the Doorstopper method, were calculated by using three-dimensional finite element studies. They are presented in tables and figures. Finally, the errors which may arise in stress calculations due to fracture induced nonlinear deformations of rock masses in the vicinity of a stress measuring cell are analyzed using two-dimensional elasto-plastic finite element studies.

32638 (ONWI—235) Evaluation of the thermomechanical behavior about a waste container/sleeve in salt. Waldman, H. (RE/SPEC, Inc., Rapid City, SD (USA)). Apr 1983. Contract AC06-76RL01830. 85p. NTIS, PC A05/MF A01. Order Number DE83011133.

This report deals with the very-near-field aspects of waste disposal in conceptual repositories within a salt medium and concentrates on the thermomechanical behavior around a drillhole containing a nuclear waste canister. Specifically, this includes an investigation of: (1) the expected closure of an unlined drillhole, and (2) the pressure buildup on a protective sleeve initially in direct contact with the drillhole wall. The results of the current study based on the disposal of unreprocessed spent fuel (SF) and a review of previous near-field studies based on the emplacement of high-level waste (HLW) are included. The current SF study uses a thermo/viscoelastic mechanical model involving an empirical creep law. Previous HLW studies were based on either a thermoelastic/plastic mechanical model or a thermo/viscoelastic model that did not include temperature dependence in the creep law. Several repository designs were considered with drillholes ranging from 50.8 cm to 61.0 cm in diameter. The thermomechanical behavior was modeled over a 25-year period after which retrieval was not expected to be a major concern. Sleeve pressures for the lined drillhole did not exceed 21 MPa and would not warrant specially designed sleeves. Unlined drillholes 53.3 cm in diameter can accommodate HLW packages up to 45 cm in diameter for at least 10 years while a 61.0-cm-diameter drillhole will accommodate SF waste packages up to 43 cm in diameter for at least 25 years.

32639 (ONWI—437) VISCOT: a two-dimensional and axisymmetric nonlinear transient thermoviscoelastic and thermoviscoplastic finite-element code for modeling time-dependent viscous mechanical behavior of a rock mass. (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 238p. NTIS, PC A11/MF A01. Order Number DE83011523.

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VISCOT is a non-linear, transient, thermal-stress finite-element code designed to determine the viscoelastic, fiscoplastic, or elastoplastic deformation of a rock mass due to mechanical and thermal loading. The numerical solution of the nonlinear incremental equilibrium equations within VISCOT is performed by using an explicit Euler time-stepping scheme. The rock mass may be modeled as a viscoplastic or viscoelastic material. The viscoplastic material model can be described by a Tresca, von Mises, Drucker-Prager or Mohr-Coulomb yield criteria (with or without strain hardening) with an associated flow rule which can be a power or an exponential law. The viscoelastic material model within VISCOT is a temperature- and stress-dependent law which has been developed specifically for salt rock masses by Pfeifle, Mellegard and Senseny in ONWI-314 topical report (1981). Site specific parameters for this creep law at the Richton, Permian, Paradox and Vacherie salt sites have been calculated and are given in ONWI-314 topical report (1981). A major application of VISCOT (in conjunction with a SCEPTER heat transfer code such as DOT) is the thermomechanical analysis of a rock mass such as salt in which significant time-dependent nonlinear deformations are expected to occur. Such problems include room- and canister-scale studies during the excavation, operation, and long-term post-closure stages in a salt repository. In Section 1.5 of this document the code custodianship and control is described along with the status of verification, validation and peer review of this report.

32640 (ONWI- -458) Porosity, permeability, and their relationship in granite, basalt, and tuff. (INTERA Environmental Consultants, Inc., Houston, TX (USA)). Apr 1983. Contract AC06-76RL01830. 96p. NTIS, PC A05/MF A01. Order Number DE83011519.

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This report discusses the porosity, storage, and permeability of fractured (mainly crystalline) rock types proposed as host rock for nuclear waste repositories. The emphasis is on the inter-relationships of these properties, but a number of reported measurements are included as well. The porosity of rock is shown to consist of fracture porosity and matrix porosity; techniques are described for determining the total interconnected porosity through both laboratory and field measurement. Permeability coefficient, as obtained by experiments ranging from laboratory to crustal scale, is discussed. Finally, the problem of determining the relationship between porosity and permeability is discussed. There is no simple, all encompassing relationship that describes the dependence of permeability upon porosity. However, two particular cases have been successfully ana-

lyzed: flow through a single rough fracture, and flow through isotropic porous rock. These two cases are discussed in this report.

32641 **(SAND—82-2505C) Subsurface damage development in rock during drag-bit cutting: observations and model predictions.** Zeuch, D.H.; Swenson, D.V.; Finger, J.T. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 22p. (CONF-830605—4). NTIS, PC A02/MF A01. Order Number DE83008380.

From 24. symposium on rock mechanics; College Station, TX, USA (20 Jun 1983).

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As part of a program to develop new technology for the reduction of well-drilling costs, we have conducted a series of single-cutter drag-bit tests on specimens of Tennessee Marble and Westerly Granite. Despite substantial differences in the mechanical properties of these two rock types, particle morphologies indicate that the same mechanism is responsible for chip formation in each case. Tested specimens were either vacuum-impregnated with dyed epoxy or immersed in fluorescent dye penetrant, then sectioned, and examined optically to study the development of subsurface damage. The subsurface fracture patterns constitute a characteristic signature which can be used to validate numerical models designed to simulate the rock-cutter interaction and the chip formation process. We show that qualitative agreement exists between observed damage patterns and predictions of a two-dimensional finite element code. Surprisingly, however, results of single-cutter tests on conditioned (i.e., precut) specimens indicate that the development of subsurface damage has little influence on the strength of the rock in subsequent passes of the cutter.

32642 **(SAND—83-0332C) Theories for instability and localization in deformation of rocks.** Passman, S.L.; Trucano, T.G. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 16p. (CONF-830615—1). NTIS, PC A02/MF A01. Order Number DE83007372.

From ASME summer meeting; Houston, TX, USA (20 Jun 1983).

It is shown that localization of deformation is a logical consequence of solutions to field equations of a type often hypothesized by experimenters on the basis of tests on rocks. Two previous studies are noted, one by James, intended to be applied to metals, and one by Coleman, intended to be applied to polymeric fibers. These two studies differ from the present one and from each other in the materials they model, in the equations used to model them, and in mathematical technique, but are similar in the conclusions they draw. Such conclusions are physically reasonable, and all three studies lead to them, although in radically different fashions.

32643 **(SAND—83-0821) Slippage on rock interfaces with spatially variable friction.** Olsson, W.A. (Sandia National Labs., Albuquerque, NM (USA)). Apr 1983. Contract AC04-76DP00789. 33p. NTIS, PC A03/MF A01. Order Number DE83011475.

Frictional slippage on material interfaces is pervasive in mechanical problems of all types, but it can be particularly important in geomechanics where slippage occurs at all scales from microcracks to great faults that bound the Earth's tectonic plates. At the intermediate scale, joints play a central role in most geomechanical problems. Current analyses invariably take frictional resistance along rock interfaces to be described by uniform, Coulombic friction. A simple theory is presented which incorporates nonuniform friction. The description is by means of continuous distributions of infinitesimal dislocations. The resulting stress-plastic strain behavior is nonlinear and stress-history dependent. The new theory overcomes several important shortcomings of the elementary theory. Implications concerning the interpretation of experimental data, both laboratory and field, are discussed.

32644 **(SAND—83-2131C) Pore pressures in marine sediments: 1981 test of the Geotechnically Instrumented Seafloor Probe (GISP).** Prindle, R.W.; Lopez, A.A. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 30p. (CONF-830514—1). NTIS, PC A03/MF A01. Order Number DE83006296.

From Offshore technology conference; Houston, TX, USA (2 May 1983).

The Geotechnically Instrumented Seafloor Probe (GISP) can make long-term, in-situ measurements of pore water pressure in marine sediments in remote, undeveloped areas. The seafloor package is completely self-contained and includes data processing electronics, solid-state memory, acoustic telemetry, batteries, and pressure transducers. Acoustic telemetry provides the communication link with a surface command and recording system. Two GISP units operated successfully for five months in a 1981 field test on the Mississippi Delta. Data obtained during this test, when combined with the results of SEASWAB I, indicate that from the mudline to a depth of 6 meters, excess pore pressure is near zero. From 6 to 15 meters (the maximum depth studied), excess pore pressure increases at about the same rate as total stress.

32645 **(UCRL—53394) Thermal and thermomechanical calculations of deep-rock nuclear waste disposal with the enhanced SANGRE code.** Heuze, F.E. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 41p. NTIS, PC A03/MF A01. Order Number DE83011054.

An attempt to model the complex thermal and mechanical phenomena occurring in the disposal of high-level nuclear wastes in rock at high power loading is described. Such processes include melting of the rock, convection of the molten material, and very high stressing of the rock mass, leading to new fracturing. Because of the phase changes and the wide temperature ranges considered, realistic models must provide for coupling of the thermal and mechanical calculations, for large deformations, and for steady-state temperature-depenent creep of the rock mass. Explicit representation of convection would be desirable, as would the ability to show fracture development and migration of fluids in cracks. Enhancements to SNAGRE consisted of: array modifications to accommodate complex variations of thermal and mechanical properties with temperature; introduction of the ability of calculate thermally induced stresses; improved management of the minimum time step and minimum temperature step to increase code efficiency; introduction of a variable heat-generation algorithm to accommodate heat decay of the nuclear materials; streamlining of the code by general editing and extensive deletion of coding used in mesh generation; and updating of the program users' manual. The enhanced LLNL version of the code was renamed LSANGRE. Phase changes were handled by introducing sharp variations in the specific heat of the rock in a narrow range about the melting point. The accuracy of this procedure was tested successfully on a melting slab problem. LSANGRE replicated the results of both the analytical solution and calculations with the finite difference TRUMP code. Following enhancement and verification, a purely thermal calculation was carried to 105 years. It went beyond the extent of maximum melt and into the beginning of the cooling phase.

32646 **(UCRL—88390) Strength and permeability of an ultra-large specimen of granitic rock.** Thorpe, R.K.; Watkins, D.J.; Ralph, W.E. (Lawrence Livermore National Lab., CA (USA); Lawrence Berkeley Lab., CA (USA)). 17 Mar 1983. Contract W-7405-ENG-48. 7p. (CONF-830605—5). NTIS, PC A02/MF A01. Order Number DE83010369.

From 24. symposium on rock mechanics; College Station, TX, USA (20 Jun 1983).

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Laboratory tests were conducted to measure the mechanical and transport properties of a 1 m diameter by 2 m high specimen of jointed granitic rock. Uniaxial loading was applied and radial permeability tests were made at various stress levels. Ultimate strength of the specimen was estimated prior to loading by testing small 52 mm diameter cores with similar fracture patterns. It was found that deformabilities of the large and small specimens were similar; however, the uniaxial strength of the large core was about 10 percent of that predicted. Although the large core contained a complex joint system, its overall permeability was dominated by a single open fracture normal to the axis. Using a simple parallel-plate analog, changes in the equivalent single-fracture aperture under load were significantly less than closures measured by means of LVDTs situated across the main fracture.

5804 Geochemistry

REFER ALSO TO CITATION(S) 31240, 32127, 32131, 32621

5805 Oceanography

REFER ALSO TO CITATION(S) 32632

64 PHYSICS RESEARCH

32647 (AECD/MISC—10) Annual scientific report, July 1979-June 1980. Al-Siddique, F.R.; Ali, M.Z.; Musa, M. (eds.). (Atomic Energy Centre, Dacca (Bangladesh)). 1980. 67p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901919.

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Research summaries are presented for experimental physics division, chemistry division, theoretical physics division, computer division, electronics laboratory, health physics division, isotope applications division, general services and engineering division, and the scientific and technical staff. (GHT)

6401 Astrophysics And Cosmology

32648 (AD-A—121438/6) X-ray lines of helium-like oxygen and neon in the solar corona. McKenzie, D.L.; Landecker, P.B. (Aerospace Corp., El Segundo, CA (USA). Space Sciences Lab.). 30 Sep 1982. 40p. NTIS, PC A03/MF A01.

Line ratios from the helium-like ions O VII and Ne IX are useful as plasma diagnostics for both flaring and nonflaring solar coronal active regions. R sub o (low density limit of R (photon flux ratio of fabrication line) uncertainties are especially important for nonflaring plasmas. We analyzed 29 nonflare solar X-ray spectra, each a sum of approx. 10 scans bv the SOLEX B spectrometer on the U.S.A.F. p78-1 satellite, to conclude that R sub o is in the range 3.7-4.1. In the relatively few flares we have analyzed we find no evidence of a departure from ionization equilibrium.

32649 (CEA-CONF—6234) Observations of the galactic center with the GSFC low-energy gamma-ray spectrometer: preliminary results. Paciesas, W.S.; Cline, T.L.; Teegarden, B.J.; Tueller, J.; Durouchoux, P.; Hameury, J.M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). 1982. 5p. (CONF-8206145—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700907.

From Workshop on the galactic center; Pasadena, CA, USA (7 Jun 1982).

The GSFC Low-Energy Gamma-Ray Spectrometer observed the galactic center on 20 November, 1981, during a balloon flight from Alice Springs, Australia. The positron annihilation line at 511 keV showed no excess over background when the galactic center was in the field-of-view; the inferred upper limit to the intensity of such a features is 1.2 x 10^{-3} photons/cm^2-s (95 percent confidence). Continuum emission was observed between 70 keV and 1 MeV.

32650 (DOE/ER/10773—2) Particle physics and cosmology. Progress report, September 1, 1982-August 31, 1983. Schramm, D.N.; Turner, M.S. (Chicago Univ., IL (USA)). May 1983. Contract AC02-80ER10773. 14p. NTIS, PC A02/MF A01. Order Number DE83011606.

Brief summaries are presented of research done in the following areas: constraints on particle properties; Big Bang nucleosynthesis; baryogenesis; phase transitions in the early universe; galaxy formation; magnetic monopoles; exotic dark matter; cosmological inflation; and ultra-high energy cosmic rays. (GHT)

32651 (DOE/ER/40048—35-L2) ^{182}Hf: a new stopwatch for the early solar system. Norman, E.B.; Schramm, D.N. (Washington Univ., Seattle (USA). Nuclear Physics Lab.; Chicago Univ., IL (USA)). 1983. Contract AC06-81ER40048. 9p. NTIS, PC A02/MF A01. Order Number DE83011486.

It is now well established that live ^{26}Al (t/sub 1/2/ = 7.2 x 10^5 yr) and ^{107}Pd (t/sub 1/2/ = 6.5 x 10^6 yr) were present in the early solar system. Thus, the nucleosynthetic vent (supernova) responsible for the production of these nuclei must have occurred no more than a few million years prior to the formation of solid bodies. It is possible that this event also produced the ^{129}I known to be present in the early solar system. However, the last event to contribute ^{244}Pu to the solar system occurred ~ 10^8 yr prior to the time of solidification. This latter time scale is also consistent with the lack of evidence for a ^{247}Cm chronometer. In this letter, we propose that ^{182}Hf (t/sub 1/2/ = 9 x 10^6 yr) can resolve the question of whether heavy-element non-actinide nucleosynthesis occurred during the ^{26}Al-producing event. The answer to this question will help to clarify the chronology of the formation of the solar system and will help to determine the astrophysical sites of heavy-element nucleosynthesis.

32652 (IFVE-OTF—81-177) Post-newtonian gravitational radiation from a binary system of compact objects in field gravitational theory. Vlasov, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. 17p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700894.

Proceeding from general formulas of the field gravitational theory in the second, postnewtonian approximation expressions are obtained for gravitational radiation intensity L, energy and angular momentum carried away by gravitational waves for the period of elliptical motion Esub(e), ΔLsub(e)sup(z), total radiated energy and angular momentum in scattering to narrow angles Esub(T), ΔLsub(T)sup(z), for a system of two compact objects. It is shown that the Peters-Mathieu coefficients in the field gravitational theory are equal $k_1=12$, $k_3=11$, and the dipole radiation is absent: ksub(D)=0. The found expressions for Esub(e), Esub(T), ΔLsub(e)sup(z), ΔLsub(T)sup(z), in the post-newtonian approximation permit to verify the correspondence of the field gravitational theory predictions to the observation results and specify the values of $F=b_2 + 2b_4$ minimum coupling parameters. In the first, newtonian approximation the field gravitational theory results correspond to the assumed value of the gravitational energy radiated by the binary stellar system.

32653 (ITEF—124(1981)) Spherization of remnants of the asymmetrical supernova explosion in the uniform medium. Bisnovatyj-Kogan, G.S.; Blinnikov, S.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1981. 28p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700908.

The spherization of a shock wave is considered, which propagates in the uniform interstellar medium in the presence of the initial asymmetry of the shape and velocity. The calculations have been made in the approximation of 1.5 dimensional hydrodynamics. Three different models have been considered in preference to the "show-plough" model. The characteristic time of the spherization is found for different values of the density of the medium and parameters of the explosion It is obtained that to the moment of the spherization in the shape of the shock large difference of the surface density on the pole and equator remains when the initial asymmetry is large. It may explain the observational features of the Cas A supernova remnant.

32654 (LA-UR—83-788) 53 Per, slow, and Be star pulsations. Lecture 8. Cox, A.N. (Los Alamos National Lab., NM (USA)). 14 Mar 1983. Contract W-7405-ENG-36. 12p. (CONF-830337—10). NTIS, PC A02/MF A01. Order Number DE83010091.

From Swiss Society of Astrophysics and Astronomy conference; Saas Fee, Switzerland (21 Mar 1983).

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Spectral variations of the class of variable stars that seems to have no radial pulsations at all are discussed. Models of the rotation of these stars are considered. (GHT)

32655 **(LA-UR—83-1023) Interaction of the plasma tail of comet Bradfield 1979L on 1980 February 6 with a possibly flare-generated solar-wind disturbance.** Niedner, M.B. Jr.; Brandt, J.C.; Zwickl, R.D.; Bame, S.J. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center; Los Alamos Scientific Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 7p. (CONF-821159—6). NTIS, PC A02/MF A01. Order Number DE83011332.

From 5. solar wind conference; Woodstock, VT, USA (1 Nov 1982).

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Solar-wind plasma data from the ISEE-3 and Helios 2 spacecraft have been examined in order to explain a uniquely rapid 10° turning of the plasma tail of comet Bradfield 1979L on 1980 February 6. An earlier study conducted before the availability of in situ solar-wind data (Brandt et al., 1980) suggested that the tail position angle change occurred in response to a solar-wind velocity shear across which the polar component changed by $\sim$ 50 km s^{-1}. The present contribution confirms this result and further suggests that the comet-tail activity was caused by non-corotating, disturbed plasma flows probably associated with an Importance 1B solar flare.

32656 **(LA-UR—83-1172) Multiple spacecraft observations of interplanetary shocks: characteristics of the upstream ulf turbulence.** Russell, C.T.; Smith, E.J.; Tsurutani, B.T.; Gosling, J.T.; Bame, S.J. (California Univ., Los Angeles (USA). Inst. of Geophysics and Planetary Physics; Jet Propulsion Lab., Pasadena, CA (USA); Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 17p. (CONF-821159—5). NTIS, PC A02/MF A01. Order Number DE83011145.

From 5. solar wind conference; Woodstock, VT, USA (1 Nov 1982).

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All interplanetary shocks observed by ISEE-3 and either ISEE-1 or ISEE-2 or both in 1978 and 1979 are examined for evidence of upstream waves. In order to characterize the properties of these shocks it is necessary to determine accurate shock normals. We invert an overdetermined set of equations to obtain shock normals, velocities and error estimates for all these shocks. Tests of the method indicate it is quite reliable. Using these normals we then calculate the Mach number and angle between the interplanetary magnetic field and the shock normal for each shock. These parameters allow us to separate the upstream waves into two classes: whistler-mode precursors which occur at low Mach numbers and upstream turbulence whose amplitude at Mach numbers greater than 1.5 is controlled by the angle of the field to the shock normal. The former waves are right-hand circularly polarized and quite monochromatic. The latter waves are more linearly polarized and have a broadband featureless spectrum.

32657 **(PB—83-133041) Strategy for space research in gravitational physics in the 1980's. Final report.** (National Academy of Sciences - National Research Council, Washington, DC (USA)). 1981. 63p. NTIS, PC A04/MF A01.

This study deals with the contribution that space measurements can make to understanding the nature of one of the four fundamental forces in the universe--gravitation. Studies in fundamental physics are being carried in earthbound laboratories, often involving the highest-energy accelerators, but the force of gravity is so weak in comparison with the other forces that only space provides an environment sufficiently free from perturbations to make possible the extra-ordinarily sensitive measurements described in this report. Gravitational experiments performed to measure relativistic effects have been limited mainly to observing the behavior of clocks, light rays, and test particles under the influence of massive bodies like the sun and Earth. The proposed strategy involves a broadening of these experiments through measurements in space of entirely new phenomena, extension of previous measurements to substantially higher levels of accuracy, and improvements of instrumentation to attempt to detect gravitational waves. Recommendations for experiments in the 1980's are divided into two classes, based on cost. The first class involves experiments that either require a dedicated spacecraft or have a major impact on a spacecraft; the second class contains experiments that either rely solely on ground-based measurements or represent small additions to spacecraft devoted primarily to other goals.

32658 **(PB—83-149773) Solar-system space physics in the 1980's: a research strategy. Final report.** (National Academy of Sciences - National Research Council, Washington, DC (USA)). 1980. 91p. NTIS, PC A05/MF A01.

This report outlines a strategy for maintaining vigorous solar system space research. The following recommendations are made. A balanced program of research devoted to interactive solar terrestrial processes, particularly for solar physics, terrestrial magnetospheric physics and terrestrial upper-atmospheric physics should be maintained; shuttle-class instruments should be kept in space longer than one week at a time; theory must play an increasingly central role in the planned development of solar-system space physics; coordinated research should be an important objective of solar-terrestrial physics; and measurements of plasmas, fields, and energetic particles must remain integral parts of each planetary mission.

32659 **(RL—82-072) Observations of ultraviolet spectra of H II regions and galaxies with IUE.** Gondhalekar, P.M. (Science Research Council, Chilton (UK). Rutherford and Appleton Labs.). Aug 1982. 14p. (CONF-820582—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700909.

From 24. COSPAR meeting; Ottawa, Canada (17 May 1982).

The ultraviolet spectra, obtained with the International Ultraviolet Explorer, of a sample of H II regions and the nuclear regions of spiral and elliptical galaxies are described. The star formation rates in the nuclei of spiral galaxies are similar to the star formation rate in the solar neighbourhood. The data indicate that the current thinking on the synthesis of carbon and nitrogen in galaxies has to be revised and the K-corrections determined from the ultraviolet spectra of galaxies when compared with the photometry of distant galaxies suggests colour evolution of galaxies at $z > 0.3$.

32660 **(RL—82-075, pp 1-44) Mass loss from Wolf-Rayet stars.** Willis, A.J. (Colorado Univ., Boulder (USA)). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

Recent results relating to the stellar winds and mass loss rates of the WR stars are reviewed, emphasising new data and their interpretation acquired at UV, IR and Radio wavelengths. The subject is discussed under the headings: physical and chemical properties of WR stars (effective temperatures and radiative luminosities; masses; chemical abundances); velocity, ionisation and excitation structure of WR winds; mass loss rates of WR stars; mass loss properties of WR stars in the LMC; comparisons with theoretical models of mass loss; ring nebulae around WR stars; conclusions.

32661 **(RL—82-075, pp 45-58) Mass loss from early-type stars.** Conti, P.S. (Colorado Univ., Boulder (USA); National Bureau of Standards, Boulder, CO (USA)). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

Stellar winds are observed in hot and luminous stars of all types. The evidence for the winds comes from observations of P Cygni profiles of resonance lines of highly ionized common species, from emission lines of highly excited ions, and from free-free radiation from the electrons in the outflowing material. The subject is discussed under the headings: introduction; spectroscopy and classification of early-type stars; diagnostics of stellar winds; derived wind strengths in early-type stars; initial mass function for early-type stars; consequences of mass loss from early-type stars (the kinetic energy input; giant HII regions; stellar winds and black holes).

32662 (RL—82-075, pp 59-66) **Shock-driven mass loss of stars.** de Jager, C.; van den Oord, G.H.J. (Astronomical Inst., Space Research Lab., Beneluxlaan, Utrecht (Netherlands)). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

We suggest that shocks, fed by multi-mode pulsational motion of the photospheres of supergiants are the basic mechanism for the mass loss of cool and medium type supergiants. We review the present theoretical situation, and describe the implementations of the observed transient mass loss component of the pulsating Beta Cephi stars BW Vul and σ Sco. We calculate the mass loss to be expected from an instantaneous injection of kinetic energy into the stellar photosphere (case of explosive shocks) and find it in fair agreement with the observational results for these stars.

32663 (RL—82-075, pp 67-93) **Physics of the atmosphere of early type stars.** Lamers, H.J.G.L.M. (Astronomical Inst., Space Research Lab., Utrecht (Netherlands)). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

This paper discusses the observed characteristics of the stellar winds of early type stars and the theories which have been proposed for explanation. It concentrates on the following subjects: the acceleration of the stellar wind; the narrow components of the UV line profiles; the super ionization of the wind; and the X-ray luminosity and the X-ray spectrum. The summary combines the information and the different theories into a more or less homogenous picture.

32664 (RL—82-075, pp 94-100) **Energetics and statistics of supernovae.** Clark, D.H. (Science Research Council, Chilton (UK). Rutherford and Appleton Labs.). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

The subject is discussed under the headings: introduction; supernova rates; supernova energetics; supernova progenitors.

32665 (RL—82-075, pp 101-107) **Radio evidence for mass outflow in the Milky Way and external galaxies.** Davies, R.D. (Nuffield Radio Astronomy Labs., Jodrell Bank (UK)). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

Radio observations, particularly in the lambda21 cm line of neutral hydrogen, show that there are substantial non-circular motions in the Milky Way gas which indicate that gas is flowing outwards. Synchrotron emission from the central regions of the Milky Way provides evidence for substantial energy release. A large amount of gas has been deposited in the outer regions of the Milky Way in the form of intermediate velocity clouds and high velocity clouds. Mass outflow is seen in the broad-line and the narrow (forbidden) line regions in Seyfert galaxies. Expanding structures 1 to 5 kpc from the centre are in a number of such galaxies. Further evidence for energy release in the central regions comes from the recent discovery of radio jet-like objects in the centres of Seyfert galaxies. The subject is discussed under the headings: mass outflow from the Galactic centre; H I data relevant to the Galactic halo; ejection of matter from ordinary galaxies.

32666 (RL—82-075, pp 108) **Galactic winds and fountains.** Kahn, F.D. (Manchester Univ. (UK). Dept of Astronomy). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

32667 (RL—82-075, pp 109-116) **Mass loss from quasars - observational evidence from their absorption-line spectra.** Smith, M.G. (Royal Observatory, Edinburgh (UK)). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

A brief account is given of the absorption-line spectra of QSOs. Evidence for mass loss at velocities of up to 0.1c (perhaps 0.18c) is found in the form of broad-absorption-line (BAL) systems. Further observational generalisations about these systems, needed in order to construct a useful mass-loss model, are fraught with difficulties. The level of ionisation is high in all cases, but two quasars with broad MGII absorption, in addition to the usual NV absorption, have recently been discovered. CIII]lambda 1909 emission appears to be broader and NV lambda 1240 emission appears to be stronger in BAL quasars than in more normal QSOs. Some sharp-lined absorption systems may also be associated with mass loss from the associated quasar.

32668 (RL—82-075, pp 117-124) **Mass loss from quasars - more observational evidence, energetics and model constraints.** Carswell, R.F. (Cambridge Univ. (UK). Inst. of Astronomy). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

The observational evidence for mass flows in the material which gives rise to the emission lines seen in quasar spectra is discussed briefly. Observed velocity differences between high-ionization and low-ionization material argue strongly that some mass flow is occurring but the form of this is very uncertain.

32669 (RL—82-075, pp 125-127) **QSO winds and the broad emission line regions.** Dyson, J.E. (Manchester Univ. (UK). Dept of Astronomy). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

It is likely that QSOs possess high speed optically thin winds. Although few models are available, the plausible electron scattering driven winds of Beltrametti and Perry (1980) suggest a characteristic mass loss rate of a few solar masses yr^{-1} and a velocity Vsub(W) approximately 0.01C. These winds have high temperatures (T approximately $> 10^7$ K) determined by the QSO radiation field, but in general have such high speeds that they are hypersonic with respect to their internal sound speeds. Generally, these winds are thermally stable unless the QSO luminosities are unusually small (Lsub(BOL) approximately $< 10^{46}$ erg s^{-1}). It is therefore unlikely that thermal instability can be the main formation mechanism for the cool BLR gas. A possible model is proposed and discussed.

32670 (RL—82-075, pp 128-146) **Interaction of galaxy and quasar winds with the intergalactic medium.** Silk, J. (California Univ., Berkeley (USA)). Apr 1982. NTIS (US Sales Only), PC A08/MF A01. (CONF-8204100—).

From RAL workshop on astronomy and astrophysics; Abingdon, UK (26 Apr 1982).

The topic of this review involves three great leaps of faith on the part of the organizing committee of the Workshop on Mass Loss from Astronomical Objects. There is not a shred of direct evidence for the existence of winds from galaxies or from quasars, nor can very much more be said about the intergalactic medium outside of the cores of rich galaxy clusters. However, indirect evidence and theoretical arguments provide a minimal level of support for these phenomena. Estimates are given for the mean power and rate of mass loss likely to be expended in the form of steady or non-steady winds from galaxies and quasars. The ensuing rates of heating and enrichment of the intergalactic medium are derived, and implications for galaxy formation and pregalactic enrichment described. A recent theory of galaxy formation based on explosive energy release from quasars and radio galaxies is reviewed, and finally this approach to galaxy formation is compared with more conventional theories.

32671 **Chemical studies of L chondrites--II. Shock-induced trace element mobilization.** Walsh, T.M.; Lipschutz, M.E. (Purdue Univ., W. Lafayette, IN). *Geochimica et Cosmochimica Acta;* **46**: No. 12, 2491-2500(Dec 1982). Contract FG02-80ER10725.

Previous studies of chondrites heated in the laboratory for extended periods under conditions approximating those in shock-heated collisional debris indicate that Au, Co, Se, Ga, Rb, Cs, Te, Bi, In, Az, Zn, Ti and Cd progress in mobility. We report data for these 13 trace elements in 14 L4-6 chondrites of established shock history and discuss these and 13 additional chondrites studied earlier. Trace element contents vary with petrologic type, S/Fe subgroup and shock history, the last dominating strongly. Absolute abundances and interelement relationships for the 6 or 7 most mobile elements vary with degree of shock-loading (i.e residual temperatures) established from mineralogic/petrologic study. A tertiary process, shock-heating, previously known to have affected radiogenic ^{40}Ar and/or ^{4}He in meteorites but not other elements, apparently was at least as effective as other open-system processes (secondary [parent body] and primary [nebular and/or accretionary] episodes) in establising mobile trace element contents of L chondrites and probably others. If conditions during each genetic episodes are to be deduced from compositional information, shocked meteorites should be avoided or effects of later processes should be compensated for.

32672 **Dynamical evolution of HII regions in non-uniform environments.** Tenorio-Tagle, G. (Max-Planck-Institut fuer Physik und Astrophysik, Garching (Germany, F.R.). Inst fuer Astrophysik). pp 1-14 of Regions of recent star formation. Proceedings of the symposium on 'Neutral clouds near HII regions - dynamics and photochemistry' held in Penticton, British Columbia, June 24-26, 1981. Roger, R.S.; Dewdney, P.E. (eds.). Dordrecht, Netherlands; D. Reidel (1982). (CONF-8106140—).

From IAU colloquium; Penticton, Canada (24 Jun 1981).

The author reviews the theories for the evolution of HII regions. A detailed description of the 'Champagne model' is presented which represents the physical process through which a compact (radio) HII region evolves into an extended (also optically observable) nebula.

6402 Atmospheric Physics

REFER ALSO TO CITATION(S) 32658

32673 (INIS-mf—7550, pp vp) **Astrophysical phenomena and radiocarbon.** Dergachev, V.A. (AN SSSR, Leningrad. Fiziko-Tekhnicheskij Inst.). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32674 (INIS-mf—7550, pp vp) **Short-term variations of radiocarbon during the last century.** Burchuladze, A.A.; Pagava, S.V. (Tbilisskij Gosudarstvennyj Univ. (USSR)); Jurina, V.; Povinec, P.; Usacev, S. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

6403 Atomic, Molecular, And Chemical Physics

REFER ALSO TO CITATION(S) 32165, 32321, 32752, 32811

32675 **(AD-A—121344/6) Creation of a closed field line compact toroid system by counterstreaming rotating relativistic electron beams. Memorandum report.** Sethian, J.D.; Gerber, K.A.; Robson, A.E.; DeSilva, A.W. (Naval Research Lab., Washington, DC (USA)). 30 Sep 1982. 34p. NTIS, PC A03/MF A01.

The formation of a Compact Toroid using two sequentially injected rotating relativistic electron beams is discussed conceptually and in practice. A single beam is used to create a plasma in an open ended field-reversed configuration. A second counter streaming beam is then used to neutralize the axial current left by the first, and therby form the closed configuration. Results of experiments that demonstrated the validity of this concept are presented. The propagation of the second beam was hindered by plasma external to the first beam channel. This plasma is inherent to the propagation of a rotating beam, and restricted the parameter range in which the compact toroid could be formed.

32676 **(DESY-SR—82-07) Resonant satellite photoemission of atomic Cu.** Bruhn, R.; Schmidt, E.; Schroeder, H.; Sonntag, B. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jun 1982. 8p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750041.

The photoemission of atomic Cu has been obtained in the photon energy range 65 eV to 90 eV. The $3d^8\,4s^2\,{}^1G$, ^3F, ^1D satellite lines are resonantly enhanced at the energy of the $3p^6\,3d^{10}\,4s \rightarrow 3p^5\,3d^{10}\,4s^2$ transitions. The intensity of the satellites versus photon energy can be approximated by two symmetric lines separated by the spinorbit splitting of the 3p-core. The satellites are driven by the $3p^5\,3d^{10}\,4s^2 \rightarrow 3p^6\,3d^8\,4s^2$ epsilonl super-Coster Kronig decay, interference effects are negligible.

32677 **(DESY-SR—82-08) VUV photoabsorption and photoemission of atomic Cr.** Bruhn, R.; Schmidt, E.; Schroeder, H.; Sonntag, B. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jun 1982. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750040.

The photoabsorption and photoemission of atomic Cr have been obtained in the photon energy range 30 eV to 70 eV. At the 3p threshold the spectrum is dominated by $3p^6\,3d^5\,4s$ (^7S) $\rightarrow 3p^5\,3d^5\,4s^2$ (^7P), $3p^5\,3d^6\,4s$ ($^7F,{}^7D,{}^7P$) transitions giving rise to discrete absorption lines and a broad asymmetric absorption band. In contrast to the higher Z members of the 3d transition metal series the Cr 3p absorption spectrum shows three well developed $3p^6\,3d^5\,4s \rightarrow 3p^5\,3d^5\,4s$ nd Rydberg series converging towards the $3p^5\,3d^5\,4s\ {}^8$Psub(5/2,7/2,9/2) states of Cr II. The $3d^4\,4s\ {}^6D$ and $3d^5\ {}^6S$ photoemission lines are strongly enhanced above the 3p threshold. As a function of photon energy the intensity of the $3d^5\ {}^6S$ line shows a symmetric profile, whereas the $3d^4\,4s\ {}^6D$ line is clearly asymmetric, thus corroborating the interference between 3p and 3d excitations. Asymmetric profiles are also displayed by the two $3d^4\,4p\ {}^6F$, $3d^4\,5s\ {}^6D$ photoemission lines.

32678 **(DOE/ER/04048—T1) Photoelectron angular distribution and photoionization cross sections for H_2.** Chiu, L.C.; Samanta, S.R. (Howard Univ., Washington, DC (USA). Dept. of Chemistry). [nd]. Contract AS05-76ER04048. 32p. NTIS, PC A03/MF A01. Order Number DE83011587.

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Photoionization of H_2 from its ground $^1\Sigma$/sub g/$^+$ state is studied theoretically. The rotational quantization is introduced in addition to the conventional vibrational-electronic transitions during the photoionization process. The photoionization differential cross section of this rotating system is derived and proved to be expressible in the simple form of $[\sigma(v')/4\pi][1 + \beta(v')P_2(\cos\theta)]$ for H_2^+ in the vibrational level v' or in the well-known form of $(\sigma$/sub T//$4\pi)$ $[1 + \beta P_2(\cos\theta)]$ after summing over all of the vibrational levels of H_2^+. The angle θ of the ejected electron is measured from the polarization direction of the radiation for the linearly polarized light or measured from the light propagation direction for the unpolarized light. The asymmetry parameters $\beta(v')$ and β, which are expressed explicitly here in terms of Racah and Clebsch-Gordan coefficients and electronic transition moments, are shown to equal approximately to 2 for the case of linearly polarized light and -1 for the case of unpolarized light. The differential cross section is also proved to be independent of the initial rotational quantum number N'' (of H_2) by neglecting vibrational-rotational interactions. Using single-center electronic wave functions for both the molecular system and the outgoing electron and including partial waves l = 1, 3 and 5 in the continuum (Coulomb) wave functions, $\sigma(v')$ and

$\beta(v')$ are computed as a function of v' at 584 A. The calculated ratios $\sigma(v')/\sigma(v'=2)$ agree with the measured vibrational intensity distributions. σ/sub T/ and β are computed in the incident photon energy range of 600 A to 440 A and the results compare favorably with previous calculations.

32679 (DOE/ER/10756—3) Atomic physics research at Columbia University Chemistry Department. Progress report, April 1, 1982-March 31, 1983. (Columbia Univ., New York (USA). Dept. of Chemistry). 1983. Contract AC02-80ER10756. 2p. NTIS, PC A02/MF A01. Order Number DE83011055.

During the last year we: (1) measured the rotational and vibrational distribution of the S_2 produce of the spin conserving reaction: $S(^1D) + OCS \rightarrow S_2(a^1\Delta) + CO$; (2) developed a two photon laser induced fluorescence method for the time resolved detection of carbon atoms in both their ground ^3P and metastable ^1D states; (3) showed that the reaction $F + HI \rightarrow HF + I$ produces I atoms only in the ^{2}P/sub 3/2/ state; (4) observed for the first time in the gas phase the Walden inversion: $F + CH_3I \rightarrow CH_3F + I$, with both J=3/2 and J=1/2 atoms being produced in a 2/1 ratio; (5) showed by laser induced fluorescence that the IF product of the reaction: $F + RI \rightarrow R + IF$ ($R = CH_3, C(CH_3)_3, CF_3$) is vibrationally and rotationally cold.

32680 (DOE/ER/40048—44-L2) Parity nonconservation in the hydrogen atom. Chupp, T.E. (Washington Univ., Seattle (USA). Dept. of Physics). 1983. Contract AC06-81ER40048. 252p. NTIS, PC A12/MF A01. Order Number DE83011458.

Portions are illegible in microfiche products; Thesis.

The development of experiments to detect parity nonconserving (PNC) mixing of the 2s/sub a/2/ and 2p/sub 1/2/ levels of the hydrogen atom in a 570 Gauss magnetic field is described. The technique involves observation of an asymmetry in the rate of microwave induced transitions at 1608 MHz due to the interference of two amplitudes, one produced by applied microwave and static electric fields and the other produced by an applied microwave field and the 2s/sub 1/2/-2p/sub 1/2/ mixing induced by a PNC Hamiltonian.

32681 (GSI—82-14) Spectroscopy of the 1ssigma-orbital in superheavy collision systems. Stiebing, K.E.; Schmidt-Boecking, H.; Schadt, W.; Bethge, K.; Schuch, R.; Hagmann, S.; Mokler, P.H.; Bosch, F.; Liesen, D.; Vincent, P. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)). 1982. 106p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750391.

The probability for the emission of quasimolecular K-radiation (K-MO-radiation) in superheavy collision systems was measured in the system $^{208}Pb + ^{208}Pb$ as function of the scattering angle and the photon energy for incident energies of 4.3 and 4.8 MeV/u. In the present article these measurements and their evaluation are extensively described. The results are discussed with special regards to the contributions from the 1ssigma-molecular orbital, because there exists a great interest on an utmost precise knowledge of the binding energy of these most strongly bound electrons. For this a survey about the dynamical model of the emission of quasimolecular X-radiation in the configuration formalism is given.

32682 (ITEP—136(1981)) Unstable system with Coulomb interaction distorted near the origin. Kerbikov, B.O. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1981. 24p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700895.

An unstable system with Coulomb interaction distorted at small distances is considered. The results are applicable to hadronic atoms analysis. A detailed investigation of the model which can be solved exactly is presented. This model contains the separable short-range potential with the Yamaguchi form factor. Closed expressions for the modified effective range function and the Coulomb-modified scattering length ase obtained.

32683 (LBL—15591) Atomic photoelectron-spectroscopy studies using synchrotron radiation. Kobrin, P.H. (Lawrence Berkeley Lab., CA (USA)). Feb 1983. Contract AC03-76SF00098. 206p. NTIS, PC A10/MF A01. Order Number DE83011740.

Thesis.

Photoelectron spectroscopy combined with tunable synchrotron radiation has been used to study the photoionization process in several atomic systems. The time structure of the synchrotron radiation source at the Stanford Synchrotron Radiation Laboratory (SSRL) was used to record time-of-flight (TOF) photoelectron spectra of gaseous Cd, Hg, Ne, Ar, Ba, and Mn. The use of two TOF analyzers made possible the measurement of photoelectron angular distributions as well as branching ratios and partial cross sections.

32684 (LBL—15902) Molecular photoemission studies using synchrotron radiation. Truesdale, C.M. (Lawrence Berkeley Lab., CA (USA)). Apr 1983. Contract AC03-76SF00098. 206p. NTIS, PC A10/MF A01. Order Number DE83012436.

The angular distributions of photoelectrons and Auger electrons were measured by electron spectroscopy using synchrotron radiation. The experimental results are compared with theoretical calculations to interpret the electronic behavior of photoionization for molecular systems.

32685 (ORO—4048) Theoretical study of radiative interaction and energy-transfer processes of molecular and atomic systems. Final report. Chiu, L.C. (Howard Univ., Washington, DC (USA). Dept. of Chemistry). 20 Dec 1979. Contract AS05-76ER04048. 5p. NTIS, PC A02/MF A01. Order Number DE83012024.

A brief summary of progress is reported on the following subject areas: electron-spin magnetic interactions in atoms and molecules, excitation transfer and coherence transfer upon molecular collisions, and radiative interactions in the atomic and molecular systems. Publications are listed. (WHK)

32686 (UCRL—88884) Noisy time-dependent spectra. Shore, B.W.; Eberly, J.H. (Lawrence Livermore National Lab., CA (USA)). 23 Feb 1983. Contract W-7405-ENG-48. 25p. (CONF-830616—1). NTIS, PC A02/MF A01. Order Number DE83009239.

From 5. Rochester conference on coherence and quantum optics; Rochester, NY, USA (13 Jun 1983).

The definition of a time-dependent spectrum registered by an idealized spectrometer responding to a time-varying electromagnetic field as proposed by Eberly and Wodkiewicz and subsequently applied to the spectrum of laser-induced fluorescence by Eberly, Kunasz, and Wodkiewicz is here extended to allow a stochastically fluctuating (interruption model) environment: we provide an algorithm for numerical determination of the time-dependent fluorescence spectrum of an atom subject to excitation by an intense noisy laser and interruptive relaxation.

6404 Fluid Physics

REFER ALSO TO CITATION(S) 32409, 32778, 32782

32687 (AD-A—123522/5) Persistent currents in a rotating superleak partially filled with superfluid helium. Interim report. Marcus, J.S. (California Univ., Los Angeles (USA). Dept. of Physics). Dec 1982. 193p. NTIS, PC A09/MF A01.

Persistent currents in a partially helium II filled rotating super-leak have been investigated. Measurements were made using the acoustic doppler shift of the thickness wave in the helium II film which covers the alumina powder grains (1 micron) of the superleak. The existence of a potential flow region (Landau region) was established and measured at low rotational speeds (below 0.5 Hz). The decay rates of persistant current velocities were measured over almost five decades of time. We found a one-to-one correspondence with our system and that of a helium II filled superleak

and also to the analogous quantities in an irreversible type-II superconductor.

32688 (CEA-N—2278) Mixed finite element method in compressible flow mechanics. Forestier, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1982. 152p. (In French). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83700354.

This study concerns the numerical treatment of time-dependent tridimensional multifluid flow. No sleeping between the two phases as physical hypotheses leads to an ultra-compressible homogeneous fluid equations. The theoretical study, in the steady state case, comes from NAVIER-STOKES equations where viscosity support exists. The time dependent framework is the wave equation. The retained approximation method is the "mixed" finite element method, as regards speed and pressure functions. The improvement brought about are as follows: generalization to tri-dimensional case of finite-element vectorial field where divergence function exists, approximation convergence by this method and in the steady case, numerical stability study in linearised case of wave equations. In the last part, a solution algorithm is presented where integrals are calculated by Gauss numerical integration.

32689 (LA-UR—83-1070) Using the surface tension to estimate the condensate density of superfluid ^{4}He. Campbell, L.J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 17p. (CONF-830456—2). NTIS, PC A02/MF A01. Order Number DE83011325.

From Symposium on quantum fluids and solids; Sanibel Island, FL, USA (11 Apr 1983).

Distortion of the condensate wavefunction at the free surface of superfluid ^{4}He contributes to the surface tension in proportion to the condensate fraction $n_0(T)$. Using this to resolve the present discrepancy between the measured and predicted temperature dependencies of the surface tension gives $n_0(T)$ in good agreement with results from neutron and x-ray scattering measurements. This picture is also consistent with the measured ^{3}He-^{4}He interfacial tension.

32690 (LA-UR—83-1252) Understanding experimentally the transition to chaos in a convecting dilute solution of ^{3}He in superfluid ^{4}He. Maeno, Y.; Haucke, H.; Wheatley, J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 22p. (CONF-830456—1). NTIS, PC A02/MF A01. Order Number DE83011150.

From Symposium on quantum fluids and solids; Sanibel Island, FL, USA (11 Apr 1983).

After a brief review of Benard convection experiments at low temperatures, experiments with dilute solutions of ^{3}He in superfluid ^{4}He in small-aspect-ratio cells are described. In both rectangular and cylindrical geometries, two states with distinctively different thermal conductances are observed. The square of the frequency of the oscillation found in the state with higher conductance is observed to vary linearly with $\epsilon = (\Delta T/\Delta T/\text{sub c/})-1$. The transition to chaos has been studied using a solution of 1.6 mole % ^{3}He in a rectangular cell with an aspect ratio $\Gamma = 1.00$ at 0.7 K. Techniques used to characterize the transition include the time series, power spectral density, phase space reconstruction of the trajectory, and Poincare sections. The analyses reveal clearly that the chaotic state is described by a strange attractor.

32691 (UCID–19683) Method in two-D Eulerian hydrodynamics. Debar, R.B. (Lawrence Livermore National Lab., CA (USA)). Mar 1974. Contract W-7405-ENG-48. 19p. NTIS, PC A02/MF A01. Order Number DE83012032.

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We are presently using at Livermore an Eulerian hydrodynamics code capable of treating compressible nonviscous flow of several fluids in a two-dimensional (axially symmetric) resion. In many respects it is reminiscent of the FLIC/PIC methods, though it is considerably different in detail. The equations are discussed.

32692 Hamiltonian structure of classical chromohydrodynamics. Gibbons, J.; Holm, D.D.; Kupershmidt, B. (Los Alamos National Lab., NM (USA). Center for Nonlinear Studies). *Physica D: Nonlinear Phenomena (Amsterdam);* **6**: No. 2, 179-194(Jan 1983).

Noncanonical Hamiltonian structures are presented both for Yang-Mills/Vlasov plasmas and for ideal fluids interacting with Yang-Mills fields. The Hamiltonian structure for the Yang-Mills/Vlasov system passes over to that for the Yang-Mills fluid in the "cold-plasma" limit. The resulting Hamiltonian structure is shown to correspond to a Lie algebra.

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REFER ALSO TO CITATION(S) 32368

32693 (ANL-HEP-CP—38-21) Report of the Fixed-Target Proton-Accelerator Group. Abe, K.; Bunce, G.; Fisk, G. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. (CONF-8206116—30). NTIS, PC A02/MF A01. Order Number DE83010705.

From DPF summer study on elementary particle physics and future facilities (APS); Aspen, CO, USA (28 Jun 1982).

The fixed target proton accelerator group divided itself into two roughly equal parts. One sub-group concentrated on a high intensity (10^{14} protons/sec) moderate energy (30 GeV) machine while the other worked on a moderate intensity (5 x 10^{11} protons/sec) very high energy (20 TeV) machine. For experiments where the total available energy is adequate, the fixed target option added to a anti p p 20 TeV collider ring has several attractive features: (1) high luminosity afforded by intense beams striking thick solid targets; (2) secondary beams of hadrons, photons, and leptons; and (3) the versatility of a fixed target facility, where many experiments can be performed independently. The proposed experiments considered by the subgroup, including neutrino, photon, hadron, and very short lived particle beams were based both on scaled up versions of similar experiments proposed for Tevatron II at Fermilab and on the 400 GeV fixed target programs at Fermilab and CERN.

32694 (ANL-HEP-CP—82-17) Planning for the next generation of proton-decay experiments in the United States. Ayres, D.S. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 16p. (CONF-820466—3). NTIS, PC A02/MF A01. Order Number DE83010741.

From 3. workshop on grand unification; Chapel Hill, NC, USA (15 Apr 1982).

There are now three well-developed proposals for new proton decay detectors to be built in the United States. These are the 1000 to 5000-ton Soudan 2 tracking calorimeter, the 1400-ton Homestake II liquid scintillator Tracking Spectrometer, and the 2500-ton University of Pennsylvania liquid-scintillator - proportional-drift-cell calorimeter. These proposals were reviewed by the Department of Energy Technical Assessment Panel on Proton Decay in February 1982. I shall describe the Soudan and Pennsylvania proposals, present the latest results from the 31-ton Soudan 1 experiment, and discuss the recommendations of the DOE Panel. Following these recommendations, a one-week workshop, to be held at Argonne in June, will focus on the optimization of techniques for future experiments.

32695 (DESY—82-037) Hadronic cross section of electron-positron annihilation at 9.5 GeV and the tau and tau resonance parameters. Albrecht, H.; Childers, R.; Darden, C.W.; Drews, G.; Hasemann, H.; Schmidt-Parzefall, W.; Schroeder, H.; Schulz, H.D.; Selonke, F.; Steinmann, E. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jun 1982. 5p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750005.

The reaction $e^+e^- \rightarrow$ hadrons has been measured in the UPSILON and UPSILON' region using the DASP detector at the DESY storage ring DORIS. The following final results are obtained: Rsub(had) (9.5 GeV) = 3.73 +- 0.16 +- 0.28, GAMMAsub(ee)(UPSILON) = (1.23 +- 0.08 +- 0.12) keV, Bsub(μμ)(UPSILON) = (= 3.2 +- 1.3 +- 0.3)%, GAMMAsub(ee)GAMMAsub(had)/GAMMAsub(tot)(UPSILON) = (0.55 +- 0.11 +- 0.06) keV, and M(UPSILON')-M(UPSILON) = (556 +- 10) MeV.

32696 **(DESY—82-039) Electroweak interactions.** Steffen, P. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jun 1982. 10p. (CONF-820371—6). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750004.

From 17. Rencontre de Moriond meeting; Les Arcs, Savoie, France (14 Mar 1982).

The recent work of the PETRA groups CELLO, JADE, MARK J and TASSO on studies of electroweak interactions is reviewed. The charge asymmetry in μ-pair production is established. It agrees with the prediction of the standard model of Glashow, Weinberg, and Salam. First results on the charge asymmetry in tau-pair production are presented. The data are interpreted in terms of values for sin²THETAsub(w) in the standard theory and of the weak coupling constants gsub(v) and gsub(a). In addition a new upper limit on the beauty lifetime is discussed, and new data on the tau branching ratios and lifetime are given.

32697 **(DESY—82-046) Inclusive rho⁰ production in e^+e^- annihilation at high energy.** Brandelik, R.; Braunschweig, W.; Gather, K.; Kirschfink, F.J.; Luebelsmeyer, K.; Martyn, H.U.; Peise, G.; Rimkus, J.; Sander, H.G.; Schmitz, D. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750044.

Tasso Collaboration.

We have observed rho⁰ production in e^+e^- annihilation to hadrons at high energies. The differential cross section at a centre of mass energy W, of 34 GeV, is presented. In the range $0.2 < X < 0.7$, we measure 0.33 +- 0.06 (stat.) +- 0.07 (syst.), 0.22 +- 0.06 +- 0.05 and 0.22 +- 0.02 +- 0.05 rho⁰/event at W = 14, 22 and 34 GeV respectively.

32698 **(DESY—82-047) Hadronic final states in high energy muon-nucleon scattering, recent results from the EMC.** Brasse, F.W. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750045.

Recent results on various aspects of hadronic final states in deep inelastic muonnucleon scattering as obtained by the European Muon Collaboration (EMC) are presented and compared with QCD: the scaled energy distributions of charged hadrons, the average psub(T)² of neutral mesons and the azimuthal dependence of charged hadrons. The size of the primordial transverse momentum is being discussed in connection with the inclusion of soft gluons. Preliminary results for hadron production on nuclei are given. Finally the new experiment (NA9) of the EMC is briefly described.

32699 **(DESY—82-062) Angular correlations in $\gamma\gamma \rightarrow$ rho⁰rho⁰ near threshold.** Althoff, M.; Braunschweig, W.; Gather, K.; Kirschfink, F.J.; Luebelsmeyer, K.; Martyn, H.U.; Peise, G.; Rimkus, J.; Sander, H.G.; Schmitz, D. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Sep 1982. 25p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750231.

We present an analysis of rho⁰rho⁰ production by two photons in the rho⁰rho⁰ invariant mass range from 1.2 to 2.0 GeV. From a study of the angular correlations in the process $\gamma\gamma \rightarrow$ rho⁰rho⁰ $\rightarrow \pi^+\pi^-\pi^+\pi^-$ we exclude a dominant contribution from Jsup(P) = 0^- or 2^- states. The data indicate sizeable contributions from Jsup(P) = 0^+ for four pion masses Msub(4π) < 1.7 GeV and from Jsup(P) = 2^+ for Msub(4π) > 1.7 GeV. The data are also well described by a model with isotropic production and uncorrelated isotropic decay of the rho⁰'s. The cross section stays high below the nominal rho⁰rho⁰ threshold, i.e. Msub(4π) < 1.5 GeV. The matrix element for rho⁰rho⁰ production is found to decrease steeply with increasing Msub(4π). Upper limits for the couplings of the iota(1440) and the THETA(1640) to $\gamma\gamma$ and rho⁰rho⁰ are given: GAMMA(iota $\rightarrow \gamma\gamma$) x B(iota $\rightarrow$ rho⁰rho⁰) < 1.0 keV and GAMMA(THETA $\rightarrow \gamma\gamma$) x B(THETA $\rightarrow$ rho⁰rho⁰) < 1.2 keV (95% C.L.).

32700 **(DESY—82-063) Coupling strengths of weak neutral currents from leptonic final states at 22 and 34 GeV.** D'Agostini, G.; Apel, W.D.; Banerjee, S.; Bodenkamp, J.; Behrend, H.J.; Chen, C.; Fenner, H.; Schachter, M.J.; Schroeder, V.; Sindt, H. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Sep 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750236.

Differential cross sections for $e^+e^- \rightarrow e^+e^-$, $\mu^+\mu^-$, $\tau^+\tau^-$ measured with the CELLO detector at $\langle\sqrt{s}\rangle$ = 34.2 GeV have been analyzed for electroweak contributions. Vector and axial vector coupling constants were obtained in a simultaneous fit to the three differential cross sections assuming a universal weak interaction for the charged leptons. The results, v^2 = -.12 +- .33 and a^2 = 1.22 +- .47, are in good agreement with predictions from the standard SU(2) x U(1) model for sin²THETAsub(w) = .228. Combining this result with neutrino-electron scattering data gives a unique axial vector dominated solution for the leptonic weak couplings. Assuming the validity of the standard model, a value of sin²THETAsub(w) = .21sub(-.09)sup(+.14) is obtained for the electroweak mixing angle. Additional vector currents are not observed (C < 0.031 is obtained at the 95% C.L.).

32701 **(DESY—82-064) Experimental study of the photon structure function F_2 in the high Q^2 region.** Bartel, W.; Cords, D.; Dietrich, G.; Dittmann, P.; Eichler, R.; Felst, R.; Haidt, D.; Krehbiel, H.; Meier, K.; Naroska, B. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Sep 1982. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750232.

We report on a measurement of the process $e^+e^- \rightarrow e^+e^-$ + hadrons, where one of the scattered electron is detected at large angles, with an average Q^2 of 23 GeV². The results are analysed in terms of the photon structure function F_2 and are compared with QCD predictions.

32702 **(DESY—82-065) Summary of the sessions on lepton-hadron physics.** Haidt, D. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Sep 1982. 13p. (CONF-820718—Exc.Summ.). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750233.

From 21. international conference on high energy physics; Paris, France (29 Jul 1982).

This report gives a short resumee of the two sessions on lepton-hadron scattering. Three topics, namely structure functions, hadronic final states and prompt leptons in beam dump experiments, are summarized.

32703 **(DESY—82-066) Electroweak tests at PETRA.** Branson, J.G. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Oct 1982. 48p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750386.

I review measurements of the electroweak interactions of leptons and quarks and searches for the source of symmetry breaking in high energy electron positron collisions at PETRA. The purely leptonic interactions, Bhabha scattering, muon pair production and tau pair production have been studied in detail. Experiments at PETRA have observed weak neutral current effects by measuring the foreward backward charge asymmetry in muon pair production to an accuracy of better than 2% at q^2 of approximately 1200 GeV². The data are interpreted in terms of sin²THETAsub(w) in the standard model and gsub(A), gsub(V) and C in more general model of electroweak interactions. Using measurements of R, we make a more accurate determination of sin²THETAsub(w) at high q^2. Technipions, charged Higgs particles and supersymmetric scalar particles have been searched for up to masses of 15 GeV.

32704 **(DESY—82-068) Experimental upper limits for hadronic and axion decays of the Y(1S).** Niczyporuk, B.; Jakubowski, Z.; Zeludziewicz, T.; Folger, G.; Lurz, B.; Vogel, H.; Volland, U.; Wegener, H.; Heimlich, F.H.; Nernst, R. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Oct 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750387.

LENA Collaboration.

A search for the decays Y → rhoπ, Y → J/psiX and Y → γa (where X is undetermined and a is an axion) has been completed using the LENA detector at the DORIS storage ring. No evidence for any of these processes was found. For these decay modes we set branching fraction upper limits (90% C.L.) of 2.1 x 10^{-3}, 2.0 x 10^{-3} and 9.1 x 10^{-4}, respectively.

32705 **(DESY—82-069) Search for charged Higgs and technipions at PETRA.** Althoff, M.; Brandelik, R.; Braunschweig, W.; Gather, K.; Kirschfink, F.J.; Luebelsmeyer, K.; Martyn, H.U.; Peise, G.; Rimkus, J.; Sander, H.G. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Oct 1982. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750383.

TASSO Collaboration.

We have searched for hadronic decay modes of unstable pointlike charged spin-zero particles such as charged Higgs bosons or technipions, produced in pairs in e^+e^- annihilation. Together with previous results on leptonic decay modes from other experiments, we conclude that at the 95% confidence level such particles do not exist in the mass range of 5 to 13 GeV.

32706 **(DESY—82-070) Charged hadron composition of the final state in e^+e annihilation at high energies.** Althoff, M.; Brandelik, R.; Braunschweig, W.; Gather, K.; Kirschfink, F.J.; Luebelsmeyer, K.; Martyn, H.U.; Peise, G.; Rimkus, J.; Sander, H.G. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Oct 1982. 31p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750385.

TASSO Collaboration.

The inclusive production of πsup(+-) and Ksup(+-) mesons and of protons and antiprotons in e^+e^- annihilation has been measured at c.m. energies of W = 14, 22 and 34 GeV. Using time of flight measurements and Ceren ov counters the full momentum range has been covered. Differential cross sections and total particle yields are given. At particle momenta of 0.4 GeV/c more than 90% of the charged hadrons are pions. With increasing momentum the fraction of pions among the charged hadrons decreases. At W = 34 GeV and a momentum of 5 GeV/c the particle fractions are approximately πsup(+-) : Ksup(+-) : p,anti p = 0.55 : 0.3 : 0.15. On average an event at W = 34 GeV contains 10.3 +- 0.4 πsup(+-) , 2.0 +- 0.2 Ksup(+-) and 0.8 +- 0.1 p,anti p. In addition, we present results on baryon correlations using a sample of events where two or more protons and/or antiprotons are observed in the final state.

32707 **(DESY—82-071) Production of anti K-pairs in photon-photon collisions and the excitation of the tensor meson f'(1515).** Althoff, M.; Brandelik, R.; Braunschweig, W.; Gather, K.; Kirschfink, F.J.; Luebelsmeyer, K.; Martyn, H.U.; Peise, G.; Rimkus, J.; Sander, H.G. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Nov 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750384.

TASSO Collaboration.

We have observed exclusive production of K^+K^- and Ksub(s)°Ksub(s)° pairs and the excitation of the f'(1515) tensor meson in photon-photon collisions. Assuming the f' to be produced in a helicity 2 state, we determine GAMMA(f'->$\gamma\gamma$)xB(f'->Kanti K) = 0.11 +- 0.02 +- 0.04 keV. The non-strange quark content of the f' is found to be less than 3% (95% c.l.). For the THETA(1640) we derive an upper limit for the product GAMMA(THETA->$\gamma\gamma$)xB(THETA->Kanti K) < 0.3 keV (95% c.l.).

32708 **(FERMILAB-Pub—83/30-EXP) Measurement of high-p/sub T/ correlations in 340-GeV/c pp and 280-GeV/c πp p reactions.** Oliver, W.P.; Limon, P.; Mantsch, P. (Tufts Univ., Medford, MA (USA); Fermi National Accelerator Lab., Batavia, IL (USA); Washington Univ., Seattle (USA)). Mar 1983. Contract AC02-76CH03000. 29p. NTIS, PC A03/MF A01. Order Number DE83010926.

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We have measured correlations between single high-p/sub T/ (1.5 < p/sub T/ < 3.5 GeV/c) trigger particles on one side of the beam line and groups of particles entering a calorimeter on the opposite side of the beam line. The mean transverse momentum measured in the calorimeter is found to increase with the trigger-particle transverse momentum. The coplanarity of the events increases with trigger-particle transferse momentum. We have compared our data to the predictions of a phenomenological four-jet model. To fit our data we find that we must give large (0.9 GeV/c) mean transverse momenta to the constituents of the initial hadrons.

32709 **(FERMILAB-PUB—83/31) Magnetic monopoles: a status report.** Carrigan, R.A. Jr.; Trower, W.P. (Fermi National Accelerator Lab., Batavia, IL (USA); Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)). Mar 1983. Contract AC02-76CH03000. 24p. NTIS, PC A02/MF A01. Order Number DE83010925.

A solitary, uncorroborated Stanford candidate event is the only evidence that magnetic monpoles derives from Dirac's assertion that monopoles could explain charge quantization and the 't Hooft-Polyakov demonstration that monopoles are an inevitable consequence of many gauge theories currently being used to unify the electroweak (photon-lepton) and nuclear (quark) interactions. The monopole abundance implied by the Stanford event is in clear contradiction to bounds on their number from astronomical data. Fortunately, the already considerable and expanding arsenal of detection techniques are being fashioned to experimentally test the many open questions surrounding monopoles.

32710 **(MPI-PAE/Exp.El.—108) Evidence for X'sub(b) production in the exclusive reaction ϵ'' -> γX'sub(b) ($\gamma\epsilon'$ or $\gamma\epsilon$).** Eigen, G.; Blanar, G.; Dietl, H.; Lorenz, E.; Pauss, F.; Vogel, H.; Boehringer, T.; Franzini, P.; Han, K.; Mageras, G. (Max-Planck-Institut fuer Physik und Astrophysik, Muenchen (Germany, F.R.). Inst. fuer Physik). Nov 1982. 29p. Available from Max-Planck-Institut fuer Physik und Astrophysik, Muenchen (Germany, F.R.).

First evidence for the production of X'sub(b) states (2^3Psub(J)) in the reaction ϵ'' -> γX'sub(b) -> $\gamma\gamma$ (ϵ' or Y) with subsequent decay of the ϵ (ϵ') into e^+e^- or $\mu^+\mu^-$ is presented. The data were obtained with the nonmagnetic CUSB detector at the Cornell e^+e^- storage ring CESR, during a run of approx.= 19000 nb^{-1}. A total of 27 events was observed showing two photons in the final state and an additional e^+e^- or $\mu^+\mu^-$ pair fitting the ϵ or ϵ' mass. The lower energy photons cluster at 100 MeV, resulting in M(X'sub(b)) approx.= 10.22 GeV (cog). Branching ratios and level positions are presented and compared with the inclusive γ spectra. The $\gamma\gamma\mu^+\mu^-$ event sample contains basically no background while the $\gamma\gamma e^+e^-$ sample contains substantial background from double radiative Bhabha scattering. An upper limit for Xsub(b) (1^3Psub(J)) production in the exclusive channele'' -> $\gamma\gamma$T is given.

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32711 **(DESY—82-038) Charmed quark fragmentation into charmed hadrons.** Jones, L.M.; Migneron, R. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jun 1982. 9p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750006.

We show that in a model where fragmentation functions are created from jet calculus followed by recombination, the fragmentation functions of charmed quarks into heavy particles such as the D and Asub(c) will fail to peak at low x at presently accessible values of Q^2. Predictions are made for the rate of D production in e^+e^- annihilation, and the ratio of Asub(c) to D.

32712 **(DESY—82-040) Fermions in lattice quantum chromodynamics.** Montvay, I. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 7p. (CONF-8205102—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750003.

From Workshop on quark matter formation and heavy ion collisions; Bielefeld, F.R. Germany (10 May 1982).

The basic concepts and recent progress in calculation of the hadron spectrum in lattice QCD are reviewed.

32713 **(DESY—82-043) Improved description of the small-x limit of deep inelastic scattering.** Loewe, M. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 56p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750047.

In this paper we attempt to find, within the framework of perturbative QCD, an improved description of the small-x region of deep-inelastic scattering, Motivated by results on the Pomeron in QCD, we investigate diagrams with a system of an arbitrary number of gluon lines in the t-channel. The gluon lines are allowed to interact pairwise in all possible combinations. We find that the leading behaviour of these diagrams comes from configurations where the gluon lines arrange themselves into non interacting, non-forward ladders. We then anayse couplings between gluon ladders, in particular non-planar ones. We compare our results with a previous study of Gribov, Levin, and Ryskin. In agreement with them we conclude that the sum of these diagrams leads to a tempered increase of the structure function in the small-x region.

32714 **(DESY—82-059) Note on the angular analysis of the decay J/PSI → f(→ ππ) + γ.** Koerner, J.G.; Kuehn, J.H.; Schneider, H. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Sep 1982. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750235.

We derive the general (4-parameter) angular decay distribution for the cascade decay J/PSI → f(→ ππ) + γ and determine its angular coefficients from the absorptive and dispersive contributions of the lowest order QCD diagram.

32715 **(DESY—82-061) Influence of fragmentation models on the determination of the strong coupling constant in e^+e^- annihilation into hadrons.** D'Agostini, G.; Apel, W.D.; Banerjee, S.; Bodenkamp, J.; Behrend, H.J.; Chen, C.; Fenner, H.; Schachter, M.J.; Schroeder, V.; Sindt, H. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Sep 1982. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750234.

Hadronic events obtained with the CELLO detector at PETRA were compared with first order QCD predictions using two different models for the fragmentation of quarks and gluons, the Hoyer model and the Lund model. Both models are in reasonable agreement with the data, although they do not completely reproduce the details of many distributions. Several methods have been applied to determine the strong coupling constant αsub(s). Although within one model the value αsub(s) varies by 20% among the different methods, the values determined using the Lund model are larger by 30% or more (depending on the method used) than the values determined with the Hoyer model. Our results using the Hoyer model are in agreement with previous results based on this approach.

32716 **(DOE/ER/01545—333) Quark and gluon latent heats at the deconfinement phase transition in SU(3) gauge theory.** Kogut, J.; Matsuoka, H.; Stone, M.; Wyld, H.W.; Shenker, S.; Shigemitsu, J.; Sinclair, D.K. (Illinois Univ., Urbana (USA). Dept. of Physics; Chicago Univ., IL (USA). James Franck Inst.; Ohio State Univ., Columbus (USA). Dept. of Physics; Notre Dame Univ., IN (USA). Dept. of Physics). Apr 1983. Contract AC02-76ER01545. 14p. NTIS, PC A02/MF A01. Order Number DE83011602.

We have run computer simulations of the quark and gluon internal energies in SU(3) lattice gauge theory neglecting dynamical fermion loops. At the first-order deconfinement - chiral-symmetry restoration transition, the internal energies display large discontinuities which nearly saturate the Stefan-Boltzmann free quark and gluon limits. The total latent heat per unit volume is roughly 1.50 +- 0.50 GeV/fm³. We present critical remarks and timing estimates for fermion computer simulation methods.

32717 **(DOE/ER/40073—1) Technical progress report. Theoretical high-energy-physics research at the University of Chicago.** (Chicago Univ., IL (USA)). Apr 1983. Contract AC02-82ER40073. 12p. NTIS, PC A02/MF A01. Order Number DE83011057.

Research activities are briefly reported. Topics include grand unified models, gluonic bound states, radiative decays of quarkonium, composite quarks and leptons, supersymmetry, magnetic monopoles in grand unified theories, and accelerator physics. (WHK)

32718 **(FERMILAB—82/92) Magnetic monopole bibliography, 1981-1982.** Craven, R.W.; Trower, W.P. (Fermi National Accelerator Lab., Batavia, IL (USA); Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Physics). Mar 1983. Contract AC02-76CH03000. 33p. NTIS, PC A03/MF A01. Order Number DE83010927.

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These last two years have again seen an increase in activity centered on the magnetic monopole concept. It has been motivated by the growing confidence in Grand Unified Theories, GUTs, and encouraged by a Stanford experiment reporting a single, uncorroborated monopole candidate event. The non-agelian gauge ideas of t Hooft and Polyakov now provide monopoles a secure home. It is the variety and behavior of monopoles in these theories which have recently attracted so much attention. With the realization that the GUT monopole would be a layered object, increasing in unification with decreasing radius, several exotic prospects for these monopoles came under discussion - baryon catalysis and monopolium. In the first interaction, a monopole which has wandered through matter, invaded a nucleus, and enveloped a proton in its electroweak unification region, may induce proton decay. Moving on, after a suitable recovery period, it can perform the same function on its next such encounter. Although the theory of this process is still far from agreed upon, some observational evidence from neutron star x-rays places severe limits on the abundance of free monopoles, the strength of the catalysis process, or both.

32719 **(IAE—3402/1) Equations of electrodynamics with a noninvariant light velocity.** Kotel'nikov, G.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1981. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700891.

Csub(16 infinity)sup(f)-invariant equations of electrodynamics are formulated. The equations derived are continuation of Maxwell equations for 5-dimensional space V^5 (t, x vector, c) in which the light velocity c is the fifth point-event coordinate parellel to radius-vector x vector and time. On the example of a finite group of transformations of Psub(10)sup(N)xΔsub(1)sup(N)-Tsub(1)sup(N) transformation properties of electromagnetic field and electric charge rho density are considered. The theorem of velocities composition is formulated. The limit transition to Minkowski space M^4 (t, x vector) contains V^5 (t, x vector, c) is considered.

32720 **(MPI-PAE/EXPL/EL—107) Statistical jet evolution and e^+e^- annihilation into hadrons.** Ochs, W. (Max-Planck-Institut fuer Physik und Astrophysik, Muenchen (Germany, F.R.). Inst. fuer Physik). Oct 1982. 13p. (CONF-820983—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750382.

From Europhysics study conference on jet structure from quark and lepton interactions; Erice-Trapani-Sicily, Italy (12 Sep 1982).

We describe the space time evolution of $e^+e^- \rightarrow$ hadrons as a sequence of transitions in a dynamical phase space where the width ΔE, Δp of distinguishable energy and momentum states decreases with increasing space time volume. The evolution process is determined by the statistical principle of instantaneous equipartition of states. Restricting to the conservation laws of energy and momentum and final state pions we arrive at a minimal model with no other parameters than h, c and msub(π). We derive predictions for multiplicities (KNO scaling), inclusive distributions (scale breaking) and energy-energy correlations.

6453 Particle Invariance Principles And Symmetries

REFER ALSO TO CITATION(S) 32680, 32730

32721 (BONN-HE—82-27) From N=1 to N=4 extended supersymmetric Yang-Mills fields in a covariant Wess-Zumino gauge. Flume, R. (Bonn Univ. (Germany, F.R.). Physikalisches Inst.). 1982. 22p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750388.

It is assumed that N=1 supersymmetric Yang-Mills fields coupled to chiral matter fields can be renormalized in a covariant Wess-Zumino gauge with a minimal number of subtractions so that the Ward identities of supersymmetry, ordinary gauge invariance and matter-field-flavour symmetries are satisfied. The chiral Yukawa couplings are supposed to remain unrenormalized. I show that on the basis of these assumptions on N=4 extended manifestly O(4) invariant theory can be constructed with finite Yukawa- and PHI^4-couplings. A consequence of these non-renormalizations is the vanishing of the renormalization group β-function.

32722 (DAMTP—82/6) Weinberg angle in the supersymmetric Weinberg-Salam model. Ecclestone, P.E. (Cambridge Univ. (UK). Dept. of Applied Mathematics and Theoretical Physics). [nd]. 5p. British Library, Boston Spa, Wetherby, West Yorks.

The gauge theory based on the graded Lie group SU(2/1) (the so-called supersymmetric Weinberg-Salam model) attracted the attention of theorists some time ago, and attempts are now being made to incorporate this model into grand unified theories. Using a consistent normalization of the group generators, it is pointed out that the model predicts sin^{2}thetasub(w)=1/2.

32723 (DESY—82-042) Note on extremes of SU(n) Higgs potentials. Cao Chang-qi. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750008.

The problem of symmetry breaking of SU(n) is discussed more completely with Higgs scalar fields belonging to an adjoint representation or an adjoint together with a fundamental one.

6454 Field Theory

REFER ALSO TO CITATION(S) 32716

32724 (BONN-HE—82-30) Algebraic geometry of multimonopoles. Nahm, W. (Bonn Univ. (Germany, F.R.). Physikalisches Inst.). Nov 1982. 12p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750381.

From 21. international colloquium on group theoretical methods in physics; Istanbul (Turkey) (23 - 28 Aug 1982).

Multimonopole solutions of the Bogomolny equation are treated by a transform to an ordinary differential equation. The solution of this equation yields algebraic curves and holomorphic line bundles over them.

32725 (DESY—82-041) Renormalisation group behaviour of O$^+$ and 2$^+$ glueball masses in SU(2) lattice gauge theory. Ishikawa, K.; Schierholz, G.; Teper, M. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750007.

We calculate the 0$^+$ and 2$^+$ glueball masses at several values of the coupling and verify compatibility with the desired renormalisation group behaviour. The calculation uses momentum smeared glueball wave functions on a large 8^4 lattice and confirms our previous results obtained on smaller lattices.

32726 (DESY—82-044) Continuum limit improved lattice action for pure Yang-Mills theory. Weisz, P. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 22p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750048.

Symanzik's programme for constructing a lattice action with improved continuum limit behaviour is considered for the case of pure Yang-Mills theory. The structure of the action is proposed and discussed in detail to lowest order perturbation theory.

32727 (DESY—82-045) Gluon propagator in temporal gauge. Dahmen, H.D.; Scholz, B.; Steiner, F. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 5p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750046.

The implementation of Gauss's law in perturbative calculations in temporal gauge is achieved through an explicit construction of the vacuum state. In this scheme the free gluon propagator is calculated. Terms in addition to the principal value part are found.

32728 (DESY—82-048) 3-dimensional SU(2) lattice gauge theory in terms of gauge invariant variables. Holtkamp, A. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). Jul 1982. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750049.

As a first step towards a duality transformation for the SU(2) lattice gauge theory in 3 dimensions, the integration over all gauge variant variables is performed explicitly after introducing gauge invariant auxiliary variables. The resulting new Hamiltonian is complex and involves a sum over closed loops. Each of these loops is confined to an elementary cube of a dual lattice. Like in a previous investigation for the 0(4) symmetric Heisenberg ferromagnet Ruehl's boson representation is used to derive the result.

32729 (DOE/ER/10957—2) Research in the theory of condensed matter and elementary particles. Progress report. (Chicago Univ., IL (USA). Dept. of Physics). 1983. Contract AC02-81ER10957. 8p. NTIS, PC A02/MF A01. Order Number DE83011371.

Brief summaries of research are given on the following topics: simulation of the phase transition in a 3-d lattice model of superconductors; string theory; commensurate-incommensurate transitions in two dimensions; chiral symmetry breaking in lattice gauge theories; the one-dimensional quark gas model; and analytical mapping of the complex plane. Publications are listed. (WHK)

32730 (DOE/ER/40008—32) Class of conformally invariant quantum field theories. Braaten, E.; Curtright, T.; Ghandour, G.; Thorn, C. (Florida Univ., Gainesville (USA). Dept. of Physics). 1982. Contract AS05-81ER40008. 10p. NTIS, PC A02/MF A01. Order Number DE83011588.

A general family of two-dimensional field theories of the Liouville type, involving one or more scalar fields, is shown to be conformally invariant when quantized canonically over a large class of Fock spaces.

32731 (IFVE-ONF—82-23) Fermions bosonization in two-dimensional models. Kulikov, A.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1982. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700892.

In an arbitrary theory a generating functional of Green functions of anti psi(x)Opsi(x) (o-matrix) combinations may be written down as a generating functional in some scalar theory. The aim of the paper is to clarify in what theory exactly it may be done. The transformation of the functional integral from Fermi fields to scalar ones has been done. The validity of this method is illustrated in some certain examples. The existence of the massive fermionic mode in some nonabelian massless model with a current-current interaction has been proved.

32732 (IFVE-OTF—81-104) Renormalization procedure, recurrent on the number of loops. Il'in, V.A.; Imashev, M.S.; Slavnov, D.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700893.

For Feynman amplitudes a new renormalization procedure recurrent on the loop number, is suggested. The method is based on calculations of "bad" ultraviolet asymptotics on the momentum of the loop. Renormalized amplitudes coincide with amplitudes renormalized in the R operation with some fixed.

6455 Scattering Theory

REFER ALSO TO CITATION(S) 32788, 32792

65 PHYSICS RESEARCH

6514 Nuclear Properties And Reactions, A=20-38

32733 (DOE/ER/40048—31-L2) **Excited-state giant dipole resonances in (p,γ); a new probe of single-particle strengths.** Dowell, D.H.; Snover, K.A.; Sandorfi, A.M.; Feldman, G.; Collins, M.T. (Washington Univ., Seattle (USA). Dept. of Physics; Oxford Univ. (UK). Nuclear Physics Lab.; Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC06-81ER40048. 13p. NTIS, PC A02/MF A01. Order Number DE83011481.

The (p,γ) reaction populating highly excited states in ^{28}Si is shown to be dominated by giant dipole resonances built upon 1 particle - 1 hole (1p-1h) states. Each giant resonance is centered at Eγ ≈ 20 MeV, with a width which increases with the energy of the 1p-1h state, and with a strength that is simply related to the proton stripping strength to the same final state.

32734 (INIS-mf—7550, pp vp) **Measurement of internal pair production in alpha- and beta-decaying nuclei.** Stanicek, J.; Chudy, M.; Povinec, P. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32735 (INIS-mf—7550, pp vp) **Determination of EC/β^+ ratio for ^{36}Cl and ^{26}Al.** Vanko, J. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32736 (LBL—15192) **Discovery of beta-delayed two-proton radioactivity in ^{22}Al and ^{26}P.** Cable,M.D.; Honkanen, J.; Parry, R.F.; Zhou, S.H.; Zhou, Z.Y.; Cerny, J. (Lawrence Berkeley Lab., CA (USA)). Jan 1983. Contract AC03-76SF00098. 7p. (CONF-830118—2). NTIS, PC A02/MF A01. Order Number DE83009094.

From 11. international workshop on gross properties of nuclei and nuclear excitations; Hirschegg, Austria (17 Jan 1983).

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^{22}Al(tau/sub 1/1/ ~ 70 ms) and ^{26}P(tau/sub 1/2/ ~ 20 ms) were produced via the (^{3}He,p4n) reaction on ^{24}Mg and ^{28}Si targets, respectively, using 110 MeV ^{3}He^{+2} beams of 3 to 7 μA from the 88-inch Cyclotron at the Lawrence Berkeley Laboratory: the effective cross section for their observation as high energy (7 to 8 MeV), beta-delayed single proton emitters was ~ a few nb. A helium jet system and a high geometry, three-element particle telescope (ΔE1,ΔE2,E) were used to search for two-proton decay events. Symmetrically divided, circular ΔE1 (24 μm for ^{23}Al, 14 μm for ^{26}P0 and ΔE2 (155 to 170 μm) detectors were employed to observe coincident, low-energy protons with each telescope subtending 4.5% of 4π sr. A standard 500 μm E detector placed behind and in coincidence with either of these two-counter telescopes observed the high energy groups from beta-delayed single proton decay as a monitor of the reactions. Results are presented. (WHK)

6515 Nuclear Properties And Reactions, A=39-58

32737 (INIS-mf—7550, pp vp) **Investigation of photonuclear reactions.** Danagulyan, A.S.; Khudaverdyan, A.G. (Erevanskij Gosudarstvennyj Univ. (USSR)); Danagulyan, S.S. (Erevanskij Fizicheskij Inst. (USSR)). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32738 (KFK—3377) **Isoscalar octupole transition rates in ^{50}Ti, ^{52}Cr and ^{208}Pb from model-independent analyses of 104 MeV α-particle scattering.** Corcalciuc, V.; Rebel, H.; Pesl, R.; Gils, H.J. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Zyklotronlaboratorium). Jul 1982. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750009.

Applying a recently proposed method for model-independent analyses experimental differential cross sections for 104 MeV α-particle scattering have been analyzed. Reliable values of isoscalar (0^+-3^-_1) octupole transition rates in ^{50}Ti, ^{52}Cr and 208 Pb are presented and compared with electromagnetic rates.

6516 Nuclear Properties And Reactions, A=59-89

REFER ALSO TO CITATION(S) 32737

32739 (DOE/ER/01167—T1) **Nuclear physics/chemistry studies. Informal technical progress report, June 1, 1982-May 31, 1983.** Turkevich, A. (Chicago Univ., IL (USA)). 29 Apr 1983. Contract AC02-76ER01167. 10p. NTIS, PC A02/MF A01. Order Number DE83010610.

The principal experimental activity during the last year was on LAMPF irradiations studying the Δ^{++} knockout from ^{88}Sr by neutrons of 500, 650, and 800 MeV. An increase in cross section with energy was observed consistent with that expected from the proposed mechanism. In the search for Glashow particles, boron was purified radiochemically from the first sample of neutron irradiated graphite and measured on a low background beta counter. No activity was seen, setting a limit of 4 x 10^{-13} for the concentration of $_6$(^{14}NX$^-$) in the original graphite.

6517 Nuclear Properties And Reactions, A=90-149

REFER ALSO TO CITATION(S) 32739

32740 (INIS-mf—7523, pp vp) (^{14}C,^{16}O) **reaction in the Sm-region.** Koerner, H.J.; Korschinek, G.; Mayer, W.; Pereira, D.; Scheerer, H.J. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01.

In Annual report 1981.

6518 Nuclear Properties And Reactions, A=150-189

REFER ALSO TO CITATION(S) 32320, 32740

32741 (DOE/ER/03346—T2) **Study of the excited states of ^{187}Pt in the decay of ^{187}Au (8.4 min).** Gnade, B.E. (Georgia Inst. of Tech., Atlanta (USA). School of Chemistry). 30 Sep 1982. Contract AS05-76ER03346. 160p. NTIS, PC A08/MF A01. Order Number DE83011217.

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The decay of ^{187}Au to ^{187}Pt has been studied with mass-separated sources from the UNISOR facility. Multiscaled spectra of γ-rays, x-rays, and conversion electrons were obtained along with γ-γ-t, γ-x-t, e$^-$-γ-t, and e$^-$-x-t coincidence data. The half life of ^{187}Au was measured to be 8.4 +- 0.3 min. A decay scheme consisting of 56 excited states and 245 transitions that incorporates 88% of the decay intensity assigned to ^{187}Au has been constructed. The i/sub 13/2/ band in ^{187}Pt is populated through low-spin band members in approximately 4% of the decays of ^{187}Au. Levels at 260, 288, and 507 keV are found to de-excite by EO transitions. The ground-state decay energy is deduced to be Q/sub EC/ = 3.90 +- 0.15 MeV from a γ-gated β^+/EC ratio. The positive parity states in ^{187}Pt are compared with calculations made with the Lund Model [Larsson et. al., 1978]. Also an anion exchange and distillation procedure is described for preparing reactor-produced carrier-free ^{18}F as K^{18}F complexed with 18-crown-6 in acetonitrile for subsequent synthesis of labelled organic compounds. The reaction sequence

$^{6}Li(n,t)\ ^{4}He$ - $^{16}O(t,n)\ ^{18}F$ produced yields of approximately 250 mCi of ^{18}F per hour per gram of 96% enriched ^{6}Li, as $^{6}LiOH \times H_2O$ target, in a reactor thermal-neutron flux of 3×10^{13} n $cm^{-2}sec^{-1}$. Yields of tritium-free carrier-free ^{18}F dissolved in the crown ether solution typically reach 85 +- 5% within the 45 minutes required for the radiochemical procedure.

32742 **(DOE/ER/40048—42-L2) How penetrable is the centrifugal barrier for fusion of ^{16}O with heavy targets.** Vandenbosch, R.; Back, B.B.; Gil, S.; Lazzarini, A.; Ray, A. (Washington Univ., Seattle (USA). Nuclear Physics Lab.). 1982. Contract AC06-81ER40048. 20p. NTIS, PC A02/MF A01. Order Number DE83011487.

Gamma ray multiplicities and rotational band transition intensites have been measured for the $^{154}Sm(^{16}O,4n)$ reaction for bombarding energies between 62.5 and 7.35 MeV. It is shown that centrifugal barrier penetration leads to a fairly broad spin distribution of the compound nucleus even at near-barrier energies. The results are discussed in terms of optical model absorption probabilities and parabolic barrier penetration probabilities.

32743 (INIS-mf—7523, pp vp) **Spectroscopy of neutron-rich, deformed nuclei using particle-γ-coincidences at the magnetic spectrograph.** Bohlen, H.G.; Lettau, H. (Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.)); Bohn, H.; Faestermann, T.; Kienle, P.; Koenig, J.; Koerner, H.J.; Mayer, W.A.; Pereira, D.; Rehm, K.E. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01.

In Annual report 1981.

32744 (INIS-mf—7523, pp vp) **High-spin properties of sup(182,184,186)W.** Emling, H.; Fuchs, P.; Grosse, E.; Kulessa, R.; Schwalm, D. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)); Bohn, H.; Faestermann, T.; von Feilitzsch, F.; Kienle, P. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01.

In Annual report 1981.

32745 **(JINR-R—7-81-610) Study on the interaction of heavy ions with monocrystals.** Bugrov, V.N.; Karamyan, S.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions). 1981. 8p. (In Russian). (CONF-8109199—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700902.

From Soviet/Japan symposium on fast charged particles interactions with crystals; Novosibirsk, USSR (28 Sep 1981).

Experimental results on nuclear fission reaction duration and on radiation damage of crystals in the interactions of 0.6-8.0 MeV/nucleon heavy ions with monocrystals by the shadow technique are presented. Nuclear fission arising under irradiation of UO_2 monocrystals with 81 MeV ^{12}C ions and W monocrystals with 174 MeV ^{22}Ne ions were investigated as well as the elastic scattering reactions of $W + ^{40}Ar$(24 MeV) and $GaP + ^{31}P$(31 MeV). To elucidate the effect of the proposed measuring procedure and the radiation damage on the measurement of the nuclear reaction duration, the model experiment was carried out. The correlation between the radiation damage and the value of the difference in shadow minimum depths as well as the systematic error in the measurement of this value are shown to be absent. The data have been obtained on the contribution of different branches of the fission on the shadow minimum characteristics.

6519 Nuclear Properties And Reactions, A=190-219

REFER ALSO TO CITATION(S) 32738, 32739

32746 **(DOE/ER/40048—45-L2) Elastic and inelastic scattering of polarized protons from lead-206 and lead-208 near isobaric analog resonances.** Back, N.L. (Washington Univ., Seattle (USA). Nuclear Physics Lab.). Jul 1982. Contract AC06-81ER40048. 359p. NTIS, PC A16/MF A01. Order Number DE83011459.

Thesis.

Excitation functions have been measured for elastic scattering of polarized protons from ^{206}Pb and ^{208}Pb, and for inelastic scattering to collective states in ^{206}Pb (2^+, 0.8033 MeV; 3^-, 2.647 MeV) and ^{208}Pb (3^-, 2.6145 MeV). Both differential cross sections and analyzing powers were measured at θ/sub lab/ = 120°, 135°, 150°, and 165°, for E/sub p/ = 14.25 to 18 MeV. Fits to the excitation-function data were obtained using scattering amplitudes consisting of sums of resonant and non-resonant parts. The resonances are the isobaric analogs (IARs) of 7 low-lying states in ^{209}Pb and 35 in ^{207}Pb. The fits to the elastic-scattering data are excellent; for the inelastic scattering the fit is very good for the 2^+ state but only fair for the 3^- states. For each IAR, the energy, the total width, and the partial width and mixing phase in each channel were obtained. Also, new spin assignments were made for a number of parent states in ^{207}Pb. The theory of Bund and Blair was used to find the spectroscopic amplitudes, which provide information on the wave functions for the parent states in ^{207}Pb and ^{209}Pb and for the 3^- states in ^{206}Pb and ^{208}Pb. These spectroscopic amplitudes were then checked for internal consistency and compared with the results of other experiments and with theoretical predictions.

32747 (INIS-mf—7523, pp vp) **Yrast states in ^{210}Ra.** Fernandez-Niello, J.; Lutz, A.; Puchta, H.; Riess, F.; Trautmann, W. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01.

In Annual report 1981.

6520 Nuclear Properties And Reactions, A=220 And Above

REFER ALSO TO CITATION(S) 32734, 32745

32748 **(CONF-820942—29) Investigation of the prompt-neutron spectrum for spontaneously-fissioning ^{252}Cf.** Poenitz, W.P.; Tamura, T. (Argonne National Lab., IL (USA); Tohoku Univ., Sendai (Japan)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83009085.

From Nuclear data for science and technology international conference; Antwerp, Belgium (6 Sep 1982).

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The prompt-fission-neutron spectrum of ^{252}Cf was investigated. The spectrum was measured with Black Neutron Detectors which have a well known efficiency. Considerations of various issues in such measurements lead to an experiment in which a time-calibration pulser, a random pulser, the neutron detector time-of-flight spectrum, the pulse-shape-discriminator gamma time-of-flight spectrum, and the detector-response spectra were simultaneously recorded for the prompt-fission neutrons, transmission through carbon, and shadowbars in a total-cross-section-type measurement. Corrections and associated uncertainties were applied for a large variety of effects which may have been overlooked in many of the previously reported measurements. Preliminary results indicate deviations from a Maxwellian shape toward a Watt-spectrum shape. Agreement is good with the shape differences relative to a Maxwellian from the recent theoretical calculation by Madland and Nix, however, a lower average energy was found.

32749 (INIS-mf—7523, pp vp) **Yrast states in ^{220}Ra.** Fernandez-Niello, J.; Reiter, M.; Riess, F. 1982. (In German). NTIS (US Sales Only), PC A09/MF A01.

In Annual report 1981.

6530 Nuclear Theory

32750 **(Juel—1789) Analysis of nuclear excited states - the escape and spreading widths.** de Haro, R. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik). Jul 1982. 274p. NTIS (US Sales Only), PC A12/MF A01. Order Number DE83750393.

Thesis. Submitted to Bonn Univ. (Germany, F.R.).

The main objective of this work was the microscopic analysis of the giant multipole resonances. In the first chapter we develop the theory. We first derive a new formalism for the RPA equations - the Fourier-Bessel RPA, in the 1p-1h approximation. The single particle continuum is fully taken into account. Then we

extend the existing formalism for the inclusion of 2p-2h contributions, deriving the equations for the full p-h polarization propagator. The propagator is expressed in terms of the mass operator in closed form, still allowing us to take into account the full continuum correctly. In chapter II we apply the formalism to the analysis of giant resonances. In a first part we study only surface modes. We develop then a method for finding possible concentrated volume strength and use it systematically to study the compression modes. Finally we analyze two outstanding current problems concerning the giant monopole and the giant quadrupole in chapter III. The contribution of 2p-2h excitations with continuum is fully considered in the theoretical description of these states.

32751 (PB—83-135020) **Photonuclear reactions above the pion threshold. Final report.** O'Connell, J.S. (National Bureau of Standards, Washington, DC (USA)). 1982. 25p. Pub. in Proceedings of the International School of Intermediate Energy Nuclear Physics, Verona, Italy, July 16-26, 1981 p189-215.

Nuclear reactions initiated by photons on electrons that excite the nucleus more than 140 MeV are reviewed with the aim of describing the nucleon and meson currents inside the nucleus.

32752 (RL—82-016) **Electron excitation in atoms and molecules by neutron-nucleus scattering.** Lovesey, S.W.; Bowman, C.D.; Johnson, R.G. (Science Research Council, Chilton (UK). Rutherford and Appleton Labs.). Mar 1982. 32p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700897.

The electronic excitation of atoms and diatomic molecules arising from neutron-nucleus scattering is examined. Both center-of-mass recoil and the coupling between electrons and nuclei arising from non-adiabatic terms neglected in the Born-Oppenheimer approximation are considered. A significant cross-section from center-of-mass recoil is predicted for single atoms for sufficiently large changes in the wavevector of the neutron. The non-adiabatic terms give rise to small cross-sections for molecules unless the spacing of the electronic states is comparable with the rotational energy constant, which is possible for transitions between excited states.

32753 **Interaction between medium energy nucleons in nuclei - 1982.** Meyer, H.O. New York, NY; American Institute of Physics (1983). 454p. (CONF-821050—). Copyright Clearance Center, Inc., Box 765, Schenectady, NY 12301.

From Cyclotron facility workshop; Bloomington, IN, USA (27 Oct 1982).

The papers presented were entered into the data base separately. (WHK)

6540 Radiation And Shielding Physics

REFER ALSO TO CITATION(S) 31326, 32793

32754 (ANL—82-88, pp 91-100) **Effects of phase on electron transport in water.** Turner, J.E.; Paretzke, H.G.; Hamm, R.N.; Wright, H.A.; Ritchie, R.H. (Oak Ridge National Lab., TN). Mar 1983. NTIS, PC A08/MF A01. (CONF-820998—).

From Workshop on the interface between radiation physics and radiation chemistry; Argonne, IL, USA (9 Sep 1982).

Dual sets of Monte Carlo calculations were performed of electron slowing down and transport in water in the liquid and vapor phases. Collision spectra, stopping powers, yields, depth-dose curves, and other quantities are compared for the two phases. 3 figures, 1 table.

32755 (CONF-8010206—Vol.2, pp vp) **Solution of the transport problem for electrons generated by an accelerator in the three-dimensional space of an absorber.** Vinogradov, V.V. (Institut Gornogo Dela, Lyubertsy (USSR)). 1981. (In Russian). Joint Institute for Nuclear Research, Dubna, USSR. (INIS-SU—133).

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The purpose of the investigation is the development of the method for calculation of distribution function of particles in the medium irradiated by electron beams. The process of particle transport was considered for infinite isotropic medium under the condition that all the particles, are concentrated in the source at first. The obtained solution can be used for investigation of particle transport through the substance with account of geometry of electron beam, particle distribution by the beam cross section, energy and angular spectra. The suggested approach can be applied for the solution of transport problems in which geometry of irradiated surface, presence of the field in the absorber should be taken into account that is significant when using electron accelerators in applied purposes.

32756 (INIS-mf—7498, pp vp) **Contribution of radiation scattering to point spread function.** Fishman, A.; Notea, A.; Segal, Y. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

32757 (INIS-mf—7498, pp vp) **Measurement of modulation transfer function.** Cohen, B.; Fishman, A.; Notea, A.; Segal, Y. (Technion-Israel Inst. of Tech., Haifa. Dept. of Nuclear Engineering). 1982. NTIS (US Sales Only), PC A12/MF A01. (CONF-820268—Vol.9-Summ).

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

32758 (LA-UR—83-1123) **Neutron-induced photon production in MCNP.** Little, R.C.; Seamon, R.E. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 12p. (CONF-830538—3). NTIS, PC A02/MF A01. Order Number DE83011173.

From 6. international conference on radiation shielding; Tokyo, Japan (16 May 1983).

Portions are illegible in microfiche products.

An improved method of neutron-induced photon production has been incorporated into the Monte Carlo transport code MCNP. The new method makes use of all partial photon-production reaction data provided by ENDF/B evaluators including photon-production cross sections as well as energy and angular distributions of secondary photons. This faithful utilization of sophisticated ENDF/B evaluations allows more precise MCNP calculations for several classes of coupled neutron-photon problems.

32759 (LA-UR—83-1138) **Weight window/importance generator for Monte Carlo streaming problems.** Booth, T.E. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 10p. (CONF-830538—2). NTIS, PC A02/MF A01. Order Number DE83011162.

From 6. international conference on radiation shielding; Tokyo, Japan (16 May 1983).

A Monte Carlo method for solving highly angle dependent streaming problems is described. The method uses a DXTRAN-like angle biasing scheme, a space-angle weight window to reduce weight fluctuations introduced by the angle biasing, and a space-angle importance generator to set parameters for the space-angle weight window. Particle leakage through a doubly-bent duct is calculated to demonstrate the method's use.

32760 **Multi-grid method for the diffusion equation with strongly discontinuous coefficients.** Alcouffe, R.E. (Los Alamos Scientific Lab., NM); Brandt, A.; Dendy, J.E. Jr.; Painter, J.W. *SIAM Journal on Scientific and Statistical Computing;* 2: No. 4, 430-454(Dec 1981). Contract W-7405-ENG-36.

The subject of this paper is the application of the multi-grid method to the solution of -del . (D(x,y)del U(x,y))+ σ (x,y)U(x,y) = f(x,y) in a bounded region Ω of R^2 where D is positive and D, σ, and f are allowed to be discontinuous across internal boundaries Γ of Ω. The emphasis is on discontinuities of orders of magnitude in D, when special techniques must be applied to restore the multi-grid methods to good efficiency. These techniques are based on the continuity of D del U across Γ. Two basic methods are derived, one in which the approximating finite difference operators on

coarser grids are five point operators (assuming the finite difference operation on the finest grid is a five point one) and one in which they are nine point operators.

6550 Medical Physics

REFER ALSO TO CITATION(S) 32325

32761 **(CONF-830204—11) Beta dosimetry using pulsed laser heating of TLD materials.** Quam, W. (EG and G, Inc., Goleta, CA (USA)). 1983. Contract AC08-83NV10282. 12p. NTIS, PC A02/MF A01. Order Number DE83009542.

From International beta dosimetry symposium; Washington, DC, USA (15 Feb 1983).

Use of a pulsed CO_2 laser to heat the surface of hot-pressed LiF chips has been investigated. The thermoluminescent traps in the first 10 to 20 μm of depth may be read out with good efficiency, which will allow entrance dose and exit dose to be determined using a standard chip. These dose data can be used to calculate beta dose and gamma dose separately. Readout speed is estimated to be a few milliseconds per chip.

32762 (INIS-mf—7499, pp vp) **Determination of dose rate of neutron/photon mixed field for ^{252}Cf.** Dosek, J. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)); Severa, L. (Tesla, Premysleni (Czechoslovakia). Vyzkumny Ustav Pristroju Jaderne Techniky). 1980. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32763 (INIS-mf—7499, pp vp) **Dosimetric evaluation of high energy neutron beams for radiotherapeutic applications.** Hrabovcova, A.; Galan, P.; Nikodemova, D. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)). 1980. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32764 (INIS-mf—7499, pp vp) **Quantities characterizing ionizing radiation effects.** Salava, J. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)). 1980. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8010311—Absts).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

32765 (INIS-mf—7545, pp vp) **Depth dose distribution of ^{90}Sr - ^{90}Y beta rays in tissue equivalent plastic for carcinogenesis studies.** Hennen, L.A.; Zoetelief, J.; Hofmeester, G.H.; Broerse, J.J. (Gezondheidsorganisatie TNO, Rijswijk (Netherlands). Radiobiologisch Inst. TNO). 1982. NTIS (US Sales Only), PC A14/MF A01.

In REP Annual Report 1981.

A model study is described to investigate the suitability of irradiation with ^{90}Sr - ^{90}Y beta rays for assessing the risks of tumour induction by ionizing radiation in general. Depth dose characteristics have been determined in tissue equivalent (TE) plastic and this information is used to establish dose distributions in the mammary glands of rats and to assess the doses in the surrounding tissues. The results indicate that the application of ^{90}Sr - ^{90}Y beta rays is particularly useful for skin irradiations, since the absorbed dose is almost constant for depth of up to 1 kgm^{-2} and the critical layer of the epidermis is generally located at depths of less than 0.1 kgm^{-2}.

32766 (INIS-mf—7550, pp vp) **QA programs at the Environmental Measurements Laboratory.** Volchok, H.L.; de Planque, G.; Sanderson, C. (Department of Energy, New York (USA). Environmental Measurements Lab.). [nd]. NTIS (US Sales Only), PC A05/MF A01. (CONF-801186—Summ).

From International conference on low-level activity measurement: low activities; Strbske Pleso, Czechoslovakia (24 Nov 1980).

32767 **Strontium-90 in bone: a case study in age-dependent dosimetric modeling.** Leggett, R.W.; Eckerman, K.F.; Williams, L.R. (Oak Ridge National Lab., TN (USA)). *Health Physics;* 43: No. 3, 307-322(Sep 1982).

An age-dependent model for the retention of ^{90}Sr in bone, which retains the uniformity and basic features of the standard man models for all age groups, is described. Age dependent compartmental models are constructed to describe changes in strontium retention in a continuous manner from birth to adulthood.

32768 **Prediction of ^{90}Sr body burdens and radiation dose in Anaktuvuk Pass Alaska Eskimos due to fallout.** Hanson, W.C.; Thomas, J.M. (Pacific Northwest Lab., Richland, WA (USA)). *Health Physics;* 43: No. 3, 323-333(Sep 1982).

Strontium-90 concentrations in skeletons of Eskimo residents of Anaktuvuk Pass, Alaska during 1954-79 were predicted from two models based on (1) Sr kinetics in human bone and (2) estimated annual ^{90}Sr ingestion rates via caribou meat. Predicted skeletal burdens of adult Eskimos gradually increased through 1961 and then rapidly achieved maximal values during 1964-66, reflecting fallout ^{90}Sr levels in caribou meat which contributed 90-97% of dietary ^{90}Sr intake. Concentrations of ^{90}Sr in male Eskimo bone samples were similar using either model. Predicted values in vertebrae of adult Eskimo males were slightly lower than values reported in New York City adults until 1980 and subsequently declined by 9% per yr, while samples from adults in New York City and San Francisco declined by 6 and 5%, respectively. Predicted skeletal burdens in Anaktuvuk Pass residents born in 1954 and 1959 achieved maxima in 1971 and 1974, respectively; concentrations in children born in 1964 were still increasing in 1979 but had achieved a lower level than older age cohorts. Estimated radiation dose rates to adult skeletons during 1964-66 were 13-15 mrad/yr based on predicted vertebrae ^{90}Sr concentrations. Those dose rates were $<=1\%$ of recommended ICRP limits for general populations.

6560 Solid State Physics

REFER ALSO TO CITATION(S) 32019, 32107, 32321

32769 **(AD-A—121415/4) Theoretical problems of the solid state. Final report 1 Aug 75-30 Apr 82.** Kohn, W. (California Univ., San Diego, La Jolla (USA). Dept. of Physics). Nov 1982. 8p. NTIS, PC A02/MF A01.

In the following paragraphs are described: A Universal Model for Surface Energies; Position Scattering from Surfaces; Narrowing of Hole Bands of Valence Electron Scattering; Dynamics Response of Inhomogeneous Fermion Systems; and Valence Fluctuation Compounds.

32770 **(CONF-810566—14) Haven ratio in the vicinity of order/disorder transitions in some two-dimensional lattice gases.** Murch, G.E. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83010582.

From International conference on fast ionic transport in solids; Gatlinburg, TN, USA (18 May 1981).

This paper reports on Monte Carlo results for the Haven Ratio in two square planar lattice gases. In the first, which has nearest neighbor exclusion, the Haven ratio decreases with increasing occupation, exhibits a minimum and goes to infinity at the known second-order phase transition. This is shown to be a percolation effect. In the second, which has nearest and next nearest neighbor exclusion, the Haven ratio decreases monotonically. This suggests the absence of a strong transition which is in agreement with other findings.

32771 (CONF-820864—5) Exact Nernst-Einstein equations and the interpretation of cross phenomenological coefficients in unary, binary, and ambipolar systems. Murch, G.E. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83010696.

From 4. europhysical topical conference on lattice defects in ionic crystals; Dublin, Ireland (30 Aug 1982).

This paper is concerned with the systematics of recently derived exact forms of the Nernst-Einstein relation and other relations among the dc ionic conductivity, the chemical diffusivity and the tracer diffusivity in unary, binary, and ambipolar diffusion systems. In addition, the cross coefficients in the phenomenological theory are interpreted with the aid of kinetic Ising-like models as solved by Monte Carlo methods. This leads to a consistent understanding of diffusion processes in discrete hopping models unfettered by approximations.

32772 (DOE/ER/05002—34) Twist-boundary energies for metals with long-range pairwise interatomic potentials. Brokman, A.; Linial, N.; Balluffi, R.W. (Massachusetts Inst. of Tech., Cambridge (USA); Hebrew Univ., Jerusalem (Israel)). Apr 1983. Contract AC02-78ER05002. 10p. NTIS, PC A02/MF A01. Order Number DE83012004.

The recent calculation of Devlin predicting that the energy of rigid [001] twist boundaries in a central force pairwise interaction model with a long-ranged potential increases linearly with Σ (for $5 \leqq \Sigma \leqq 37$) is considered. By use of a general argument based on the Geometry of Numbers it is shown that this linear increase of the energy is too strong to be physically reasonable. Instead, the energy approaches a constant asymptotic value in this range, and any variations can be represented by a higher order term which varies as the order of Σ^{-}/sup 3/4/.

32773 (GKSS—82/E/11) Dislocation crack model, as applied to determining the crack toughness of metals. Pfuff, M. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)). 1982. 42p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750021.

The representation of cracks by dislocations, which will be introduced and briefly applied to classical crack problems, reduces the calculation of the fracture toughness of plastically deformable solids to the calculation of the energy of continuous distributions of dislocations. The crack model introduced by Bilby, Cottrell and Swinden will be modified in order to take the conditions into account which are necessary to activate the dislocation sources at the crack tip. This leads to a fracture criterion which can be used to explain the high values of the fracture toughness measured for metals and the characteristic brittle-to-ductile transition.

32774 (KFTI—81-7, pp 31-32) Focused collisions in two-atom chains. Dzhaparidze, S.K. (AN Gruzinskoj SSR, Tbilisi. Inst. Fiziki); Orlov, A.N.; Trushin, Yu.V. (AN SSSR, Leningrad. Fiziko-Tekhnicheskij Inst.). 1981. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Focussed collisions in two-atom chain have been considered theoretically. Calculations have been performed in the approximation of hard balls. Authors have been systematized all the kinds of focussed transfer of pulse representing the chain as consisting of cells each containing two interatomic distances. At that, along with the already known focusons and defocusons discovered were also new kinds of such motions as even and odd focusons and defocusons. Calculational results for the Fe-Al system are given. It is shown that some of the above kinds of focusing are realized also in the one-atom case.

32775 (LA-UR—83-996) Contribution to the theory of positive muon diffusion in metals at low temperature. Yaouanc, A. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 5p. (CONF-830455—2). NTIS, PC A02/MF A01. Order Number DE83011308.

From Yamada conference on muon spin rotation and associated problems; Shimoda, Japan (18 Apr 1983).

We study the temperature dependence of the μ^{+} diffusion in a metal within the small polaron theory. The geometry of the strain field due to an impurity is shown to strongly influence the μ^{+} diffusion properties. We reanalyzed part of the Al data.

32776 (LBL—12223) Calculations of the electron-damping force on moving-edge dislocations. Mohri, T. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 119p. NTIS, PC A06/MF A01. Order Number DE83011744.

Portions are illegible in microfiche products; Thesis.

Dynamic effect of a moving dislocation has been recognized as one of essential features of deformation behavior at very low temperatures. Damping mechanisms are the central problems in this field. Based on the free-electron-gas model, the electron-damping force (friction force) on a moving-edge dislocation in a normal state is estimated. By applying classical MacKenzie-Sondheimer's procedures, the electrical resistivity caused by a moving dislocation is first estimated, and the damping force is calculated as a Joule-heat-energy dissipation. The calculated values are 3.63×10^{-6}, 7.62×10^{-7} and 1.00×10^{-6} [dyn sec/cm^{-2}] for Al, Cu and Pb, respectively. These values show fairly good agreements as compared with experimental results. Also, numerical calculations are carried out to estimate magnetic effects caused by a moving dislocation. The results are negative and any magnetic effects are not expected. In order to treat deformation behavior at very low temperatures, a unification of three important deformation problems is attempted and a fundamental equation is derived.

32777 (UCID—19401) Theoretical manual for DYNA3D. Hallquist, J.O. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 81p. NTIS, PC A05/MF A01. Order Number DE83011209.

This report provides a theoretical manual for DYNA3D, a vectorized explicit three-dimensional finite element code for analyzing the large deformation dynamic response of inelastic solids. A contact-impact algorithm that permits gaps and sliding along material interfaces is described. By a specialization of this algorithm, such interfaces can be rigidly tied to admit variable zoning without the need of transition regions. Spatial discretization is achieved by the use of 8-node solid elements, and the equations-of-motion are integrated by the central difference method. DYNA3D is operational on the CRAY-1 and CDC7600 computers.

32778 (UCID—19787) Analysis of NSWC quasi-static compaction data for porous beds of ball powder, melamine, and Teflon, using structural compaction model. Weston, A.M.; Lee, E.L. (Lawrence Livermore National Lab., CA (USA)). 6 Apr 1983. Contract W-7405-ENG-48. 20p. NTIS, PC A02/MF A01. Order Number DE83012043.

A structural compaction model is used to correlate NSWC quasi-static compaction data on porous beds of six (6) different materials, i.e., four (4) ball powders, melamine, and Teflon. Initial densities of the porous beds ranged from 44 percent solid theoretical maximum density (TMD) to 70 percent TMD. Maximum compacted densities were about 90 percent TMD except for Teflon which was compacted to approximately 98 percent TMD. Pressures calculated by the model, plotted as a function of percent TMD, agree well with the NSWC data.

32779 (UCRL—88358) 3-D Bauschinger-effect model suitable for use in large computer codes. Moss, W.C.; Glenn, L.A. (Lawrence Livermore National Lab., CA (USA)). 3 Mar 1983. Contract W-7405-ENG-48. 23p. (CONF-830613—1). NTIS, PC A02/MF A01. Order Number DE83008595.

From Plasticity today symposium; Udine, Italy (27 Jun 1983).

A 3-D Bauschinger-effect model for isotropic elastic-plastic materials is proposed. The model contains three parameters, two of which may be obtained from a proportional loading-unloading experiment. The third can be obtained from a nonproportional test. The model is useful because it is simple to implement and is fast computationally.

32780 (UCRL—88862) **Selection and optimization of nonlinear material models for Lagrangian continuum computation.** Goudreau, G.L.; Hallquist, J.O. (Lawrence Livermore National Lab., CA (USA)). 5 Mar 1983. Contract W-7405-ENG-48. 10p. (CONF-830615—2). NTIS, PC A02/MF A01. Order Number DE83009240.

From ASME summer meeting; Houston, TX, USA (20 Jun 1983).

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A library of material models suitable for large Lagrangian continuum computation is presented in the context of the explicit DYNA and implicit NIKE finite element codes at the Lawrence Livermore National Laboratory. Both strain measures and material formulation are seen as a homogeneous stress point problem separate from field discretization and a flexible material subroutine interface admits both incremental and total strain formulation, dependent on internal energy or an arbitrary set of other internal variables. Our basic material library is reviewed including our latest selection for finite strain rate independent plasticity, hydrodynamic equations of state, and a new multisurface plasticity model. The emphasis is on integrating a selection of the models of others for variety and economy of material representation, as well as optimal programming for efficient computing.

6561 Superconductivity

REFER ALSO TO CITATION(S) 32009, 32010, 32072, 32729

32781 **Dispersion theory and moments relations in magneto-optics.** Smith, D.Y. (Argonne National Lab., IL). pp 133-182 of Theoretical aspects and new developments in magneto-optics. Devreese, J.T. (ed.). New York, NY; Plenum Publishing Corp. (1980).

The material covered in this paper is based on recent advances in dispersion theory and the sum rule or moments analysis of optical data which were prompted in large part by the discovery of magneto-optical effects in defects that could not be analyzed by conventional theory. The purpose of this work is to provide both an introduction to these new methods and some insight into the physics on which they are based. These techniques are illustrated by the analysis of the broad-band magneto-optic spectra of defects in insulators--a case for which the magnetic splitting is much less than the absorption-band width and for which the Becuqerel rigid-shift approximation fails.

6570 Theoretical Physics

REFER ALSO TO CITATION(S) 32254, 32652, 32657, 32781, 32931

32782 (ANL—82-62, pp 86-97) **Viscous effect on acoustic scattering by elastic solid cylinders and spheres.** Lin, W.H.; Raptis, A.C. (Argonne National Lab., IL). Sep 1982. NTIS, PC A99/MF A01. (CONF-820612—).

From Symposium on instrumentation and control for fossil energy processes; Houston, TX, USA (7 Jun 1982).

This paper deals with analytic studies and numerical results of the scattering of plane sound waves from an elastic circular cylinder and from an elastic sphere in a viscous fluid. The elastic properties of the cylinder and the sphere and the viscosity of the surrounding fluid are taken into account in the solution of the acoustic-scattering problems. The associated acoustic quantities, such as the acoustic radiation forces, the acoustic attenuation, then evaluated numerically for a given set of material properties. Numerical results show that increasing fluid viscosity tends to increase the directionality of the angular distribution of the scattering patterns, especially in the forward direction. The acoustic-radiation force on the cylinder or on the sphere is in the direction of the incident wave and increases as the viscosity of the fluid increases. The present study concerns the scattering of a plane sound wave from an elastic, homogeneous, solid sphere and a circular cylinder immersed in an infinite, viscous, barotropic, compressible fluid. The primary objectives of the study are to investigate the effect of fluid viscosity on acoustic-wave provide an analytical basis to enhance the experimental determination of the fluid viscosity.

32783 (GA-A—17013, pp B.1-B.43) **Review of vortex shedding noise from cylinders.** Blevins, R.D. (GA Technologies Inc., San Diego, CA). Mar 1983. NTIS, PC A05/MF A01. Contract AT03-82ER12023.

In Acoustic resonance in heat-exchanger tube banks. First annual report.

Sound induced by periodic vortex shedding from cylinders has been studied more or less continuously since the first quantitative study by Strouhal in 1878. Measurements have shown that vortex shedding is a dipole source of sound. Theoretical models for aeroacoustic sound in a free space, mostly inspired by Lighthill's work, have been developed which can replicate the measurements once the vortex shedding force, coherence, and periodicity are experimentally measured. Vortex shedding from tubes in heat exchanger tube bundles can reach damaging intensities because the acoustic mode is bound by the lower speed of sound within the tube bank itself. However, the amplitude and occurrence of the resonance can only be approximately predicted at present.

32784 (JINR-D—10-11-81-622, pp 37-51) **Variational-discrete models of a continuous medium.** Samarskij, A.A.; Favorskij, A.P. (AN SSSR, Moscow. Inst. Prikladnoj Matematiki). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR. (CONF-8009243—).

From International meeting on problems of mathematical simulation in nuclear physics researches; Dubna, USSR (30 Sep 1980).

The advantages of variational principles in description and investigation of the problems of theoretical and mathematical physics are considered. It is shown that the variational approach permits the construction of totally conservative schemes in cylindrical, spherical and any randon coordinate systems. The variational approach is successfully applied for constructing a totally conservative scheme of the ideal MHD, The variational approach remains in force in the case of three-dimensional calculations as well. Variational principles are effectively used in constructing difference schemes for the equation of heat conduction type and on the solution of multidimensional applied problems.

32785 (JINR-D—10-11-81-622, pp 94-102) **Numerical analysis of properties of many-dimensional soliton-like objects.** Makhan'kov, V.G.; Shvachka, A.B. 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR. (CONF-8009243—).

From International meeting on problems of mathematical simulation in nuclear physics researches; Dubna, USSR (30 Sep 1980).

Numerical investigation of soliton solutions of finite energy of classical nonlinear wave equations is carried out. It is stressed that the numerical experiment is nowadays one of the powerful instruments for hamiltonian systems investigation. The primary problem is the problem of soliton stability in the course of transition from one to several space variables. The importance of investigation by means of a computer of dynamic properties of two and three-dimensional satisfactorily localized solutions for different models of the field theory is pointed out. As an example two models of the classical field theory are considered. It is shown that the soliton interaction character in collisions is determined by dispersion dependence and not by the model type. A more detailed investigation of the quasisolitons interaction process has shown that it depends also on the sight parameter value and initial phase difference.

32786 (JINR-R—2-81-799) **Parastatistics and parafields.** Govorkov, A.B. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1981. 13p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700896.

An attempt has been made to answer the following questions: which schemes of the second quantization of a field can correspond at all to parastatistics and what are those necessary conditions, which must be satisfied with these schemes. Suggested is the existence of operators of particle production and annihilation, on which general restrictions resulted from postulates of quantum theory are imposed and to which particular requirements related to a certain statistics type are claimed . The Bogolyubov method,

where directly density matrix, which must be symmetrical in any case, is subjected to the second quantization, but not a wave function of identical particles, which symmetry is unknown beforehand, is used. Initially the consideration is performed within the framework of nonrelativistic theory. Transition to relativistic theory is accomplished after establishment of commutation relations for the production and annihilation operators. The postulates of the second quantization are formulated. A theorem of coupling of parastatistics and the Green field paraquantization is proved on the basis of additional postulates determining the Fock space.

32787 **(SAND—83-8212) TACO3D: a three-dimensional finite-element heat-transfer code.** Mason, W.E. (Sandia National Labs., Livermore, CA (USA)). Apr 1983. Contract AC04-76DP00789. 93p. NTIS, PC A05/MF A01. Order Number DE83011520.

TACO3D is a finite element computer code for the solution of nonlinear, three-dimensional heat-transfer problems. In this report, the theory on which the code is based is outlined and the numerical-solution procedures are explained. The features and capabilities of code are described. Instructions to enable the user to construct a data-input file and execute the code are provided. And, finally, examples illustrating the use of the code are given.

32788 **Foundations of theoretical mechanics II. Birkhoffian generalization of Hamiltonian mechanics.** Santilli, R.M. New York, NY; Springer-Verlag New York Inc. (1982). 473p.

It is established that all Newtonian systems satisfying certain locality, regularity and smoothness conditions, whether conservative or non-conservative, can be treated by conventional variational principles, Lie algebra techniques, and symplectic geometrical formulations. A theorem of the direct universality of the inverse problem is proved and the transformation theory of Birkoff's equations is presented. A number of applications to ordinary differential equations in, for example, engineering and biophysics are discussed, as well as implications of the Birkhoffian representation for relativity theory. (KAW)

32789 **Kinetics of nonuniform deformation.** Kocks, U.F. (Argonne National Lab., IL). *Progress in Materials Science;* 185-241(1978).

This is not a review article. It does not summarize our current understanding in the literature of the many different phenomena associated with nonuniform deformation and unstable flow. It does not emphasize the most pressing current problems or arguments. And most of all, it makes only scant reference to available experimental evidence, though suggestions for needed measurements are occasionally made. This article is an attempt to answer the question, what material characteristics determine which of the various kinds of nonuniform or unstable deformation are observed, and how rapidly do they develop. It is an exposition of a scheme to evaluate and represent relevant material properties, and it lays the groundwork for a prediction of macroscopic behavior under various boundary conditions. The review presented is a personal one, which has not as yet had the benefit of sufficient widespread scrutiny. While many of its component parts are rephrased versions of results absorbed from the literature, there are some novel suggestions.

6580 Mathematical Physics

32790 **(CEA-CONF—6306) One dimensional beam. Asymptotic and self similar solutions.** Feix, M.R.; Duranceau, J.L.; Besnard, D. (CEA Centre d'Etudes de Limeil, 94 - Villeneuve-Saint-Georges (France)). Jun 1982. 14p. (CONF-820618—11). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700903.

From International conference on plasma physics; Goteborg, Sweden (7 Jun 1982).

Rescaling transformations provide a useful tool to solve nonlinear problems described by partial derivative equations. A brief review of this method is presented together with the connection with the self similar solutions obtained by compacting the independent variable with one of them (the time). The general theory is reported through examples found in Plasma Physics with a careful distinction between systems described by Hamiltonian and others where irreversible phenomena, like diffusion, are taken into account.

32791 **(SAND—82-2517C) Global error estimation for stiff ODEs.** Shampine, L.F. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 11p. (CONF-830603—1). NTIS, PC A02/MF A01. Order Number DE83003294.

From Numerical analysis conference; Dundee, UK (28 Jun 1983).

Some years ago we devised a way to estimate the global error when solving stiff ODEs which is interesting because it is very simple and very cheap. Undoubtedly the most popular codes for the solution of stiff ODEs are based on the backward differentiation formulas (BDF). The scheme described in applied to the BDF of orders 1 to 3 but not to orders 4 to 6. Because we were unable to handle the popular codes which all vary the order of the BDF used between one and five, we gave the scheme only the limited circulation of a report. On returning to the matter recently we saw how to broaden the applicability of the method greatly, in particular to include all the BDF, and to understand much better an important approximation made. We explain this new treatment of our approach to global error estimation. Since the report, Prothero has given an approach to estimation of global error which is closely related to the way we now view our approach. We shall review his approach and contrast his assumptions with the ones we make and point out an important restriction. Finally we draw upon an approximation made by Prothero to extend the applicability of the procedure developed, in some cases to improve the accuracy of the procedure.

32792 **(UCRL—15524) Mathematical issues in inverse problems. Final report. Task II.** Deschamps, G.A. (Illinois Univ., Urbana (USA). Dept. of Electrical Engineering). Dec 1982. Contract W-7405-ENG-48. 23p. NTIS, PC A02/MF A01. Order Number DE83012107.

The main goal of this short research was to formulate problems rather than to solve them. The emphasis was to be on mathematical considerations. An important criterion in the choice of problems was to select those that promised practical solutions. The report is made up of several loosely connected items. In Section 1 the abstract inverse problem is defined at a level of generality that makes it representative of a wide range of problems and lead to a formulation of related questions such as the importance of approximating the corresponding direct problem. In Section 2 some probabilistic considerations account for noise in various elements of the system considered. It shows the relation to the communication problem and suggests the use of information theory concepts. Ill-posed problems and their regularization are defined in Section 3. In Section 4 the high frequency approximation is discussed. In Section 5 the effects of discretization as a regularization method are noted. A particular multilayer problem is presented in Section 6 (incompletely solved). Short comments on the use of polarization constitute Section 7.

6590 Communication, Education, History, And Philosophy

REFER ALSO TO CITATION(S) 32917

32793 **(ORAU—212) Health physics/radiation protection enrollments and degrees, 1982.** (Oak Ridge Associated Universities, Inc., TN (USA)). Apr 1983. Contract AC05-76OR00033. 65p. NTIS, PC A04/MF A01. Order Number DE83011594.

This report presents data on the number of students enrolled and the degrees awarded in academic year 1981 to 1982 from 61 US universities offering degree programs in radiation protection or related areas that would enable graduates to work as health physicists. The report includes historical survey data for the last decade and provides information about enrollment and degree trends, foreign national student participation, female and minority student participation, and placement of graduates. Also included is a listing of the universities by type of program and number of students.

70 FUSION ENERGY

7001 Plasma Research

REFER ALSO TO CITATION(S) 32353

32794 **(AD-A—123569/6) Saturation of the lower-hybrid-drift instability by mode coupling. Memorandum report.** Drake, J.P.; Guzdar, P.N.; Huba, J.D. (Naval Research Lab., Washington, DC (USA)). 26 Jan 1983. 11p. NTIS, PC A02/MF A01.

A nonlinear mode-coupling theory of the lower-hybrid-drift instability is presented. A 2-D mode equation is derived which includes the nonlinear polarization and E X B electron drifts, adiabatic ions, and realistic sources and sinks of energy. It is found that the instability saturates by transfering energy from the growing, long wavelength modes to the damped, short wavelength modes. The saturation energy, mean square of the potential fluctuations, and diffusion coefficient are calculated self-consistently.

32795 **(CONF-830406—31) Transport scaling studies for EBT reactor.** Uckan, T.; Jaeger, E.F.; Uckan, N.A. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE83011393.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

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Transport simulation and modeling studies for the ELMO bumpy Torus (EBT) reactor are carried out by using 0-D and 1-1/2-D transport calculations. The time-dependent 0-D model is used for global analysis whereas the 1-1/2-D radial transport code is used for accurate determination of density, temperature, and ambipolar potential profiles and of the role of these profiles in reactor plasma performance. Analysis with the 1-1/2-D transport code shows that profile effects near the outer edge of the hot electron ring lead to enhanced confinement by a least a factor of 2 to 5 beyond the simple scaling that is obtained from the global analysis. The radial profiles of core plasma density and temperatures (or core pressure) obtained from 1-1/2-D transport calculations are found to be similar to those theoretically required for stability.

32796 **(CONF-830406—37) Microwave transport in EBT distribution manifolds using Monte Carlo ray-tracing techniques.** Lillie, R.A.; White, T.L.; Gabriel, T.A.; Alsmiller, R.G. Jr. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE83012068.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

Ray tracing Monte Carlo calculations have been carried out using an existing Monte Carlo radiation transport code to obtain estimates of the microsave power exiting the torus coupling links in EPT microwave manifolds. The microwave power loss and polarization at surface reflections were accounted for by treating the microwaves as plane waves reflecting off plane surfaces. Agreement on the order of 10% was obtained between the measured and calculated output power distribution for an existing EBT-S toroidal manifold. A cost effective iterative procedure utilizing the Monte Carlo history data was implemented to predict design changes which could produce increased manifold efficiency and improved output power uniformity.

32797 (CONF-8110118—, pp 73-81) **Diagnostic injector for the Tokamak de Varennes.** Shubaly, M.R. (Atomic Energy of Canada Ltd., Chalk River, Ontario). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

After a brief review of the design for the Tokamak de Varennes, the preliminary design for a 2 A, 30 keV diagnostic injector is presented. Some of the particular problems are the requirements on beamlet size and divergence, the need for scanning across the plasma and the interaction between the injector and the magnetic field of the tokamak.

32798 (CONF-8110118—, pp 83-92) **Sciopticon array analysis of ORNL ion sources.** Ryan, P.M.; Whealton, J.H.; Feezell, R.R. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The neutral beam sciopticon (pinhold camera) has been expanded to an array of pinhole apertures in order to simplify the process of distinguishing between beam imperfections caused by extraction sonuniformities and those caused by beamlet missteering. An analysis scheme is presented whereby the power transmission loss due to beamlet missteering may be estimated if the average beamlet divergence angle is known. For a well-focused ion source, the sciopticon array can also give the approximate beam focal length and average beamlet divergence angle. Results from testing five ORNL ion sources indicate that the principal mechanism for differences in power transmission is beamlet missteering.

32799 (CONF-8110118—, pp 93-104) **Measurements of angular divergence of a multi-megawatt ion and neutral beam.** 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Results are presented of three independent methods of measuring the divergence of the neutral beam generated by a one-quarter-sized JET type source with 72 extraction holes. The two optical methods, which measure radiation from the fast neutrals, indicate a neutral beam-core divergence of $\Omega = 0.4°$ to $0.5°$. The third method measures the ion angular distribution from which we estimate $\Omega \approx 0.35°$. These results are compared. They show that it is possible to achieve a high beam brightness for a multi-megawatt neutral beam source.

32800 **(DOE/ET/53016—81) Measurement of high-beta tokamak pressure profiles with multipoint Thomson scattering.** Levinton, F.M. (Columbia Univ., New York (USA). Plasma Physics Lab.). 1983. Contract AC02-76ET53016. 120p. (COO—2456-81). NTIS, PC A06/MF A01. Order Number DE83012452.

Thesis.

A multipoint Thomson-scattering system has been developed to obtain pressure profiles along the major radius of Torus II, a high-beta tokamak. The profiles obtained during the 20 to 25 μs lifetime of the discharge indicates that the plasma has a peak temperature of 80 eV and density of 1.0×10^{15} cm^{-3}. The profiles remain fairly constant during this time until the equilibrium is lost, after which the temperature and density decays to 10 eV and 10^{14} cm^{-3} very quickly ($\sim$ 1 μs). Experimental results show Torus II has a high-beta ($<\beta> \sim$ 10%) equilibrium, with a strong shift of the peak of the pressure profile towards the outside. Numerical results from a 2-D free boundary MHD equilibrium code have obtained equilibria which closely approximate the experimentally measured profiles.

32801 **(DOE/ET/53051—50) Experiments on shear Alfven resonance in a tokamak.** Prager, S.C.; Witherspoon, F.D.; Kieras, C.E.; Kortbawi, D.; Sprott, J.C.; Tataronis, J.A. (Wisconsin Univ., Madison (USA)). Feb 1983. Contract AC02-76ET53051. 11p. (CONF-830210—18). NTIS, PC A02/MF A01. Order Number DE83011028.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

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Detailed observations have been made of the spatial structure of the wave magnetic field. Measurements of the resonance properties such as radial location, wave polarization, resonance width and risetime are all consistent with shear Alfven resonance theory, although several measurements require improvement in resolution. The resonance location agrees with prediction of a fully two-dimensional ideal MHD theory for the Tokapole II device. To complete the identification a frequency scan and careful comparison of the observed resonance with antenna loading will be undertaken.

32802 **(DOE/ET/53051—53) Cyclotron heating rate in a parabolic mirror.** Smith, P.K. (Wisconsin Univ., Madison (USA). Dept. of Physics). Mar 1983. Contract AC02-76ET53051. 22p. NTIS, PC A02/MF A01. Order Number DE83011627.

Cyclotron resonance heating rates are found for a parabolic magnetic mirror. The equation of motion for perpendicular velocity is solved, including the radial magnetic field terms neglected in earlier papers. The expression for heating rate involves an infinite series of Anger's and Weber's functions, compared with a single term for the unrevised expression. The new results show an increase of heating rate compared with previous results. A simple expression is given for the ratio of the heating rates.

32803 **(DOE/ET/53088—80) Scattering of regularized-long-wave solitary waves.** Morrison, P.J.; Meiss, J.D.; Cary, J.R. (Texas Univ., Austin (USA). Inst. for Fusion Studies). Apr 1983. Contract FG05-80ET53088. 44p. NTIS, PC A03/MF A01. Order Number DE83011367.

The Lagrangian density for the regularized-long-wave equation (also known as the BBM equation) is presented. Application of Noether's theorem determines three constants of motion. Using the trial function technique, ordinary differential equations that describe the time dependence of the position of the peaks, amplitudes, and widths for the collision of two solitary waves are obtained. These equations are analyzed in the Born and equal-width approximations and compared with numerical results obtained by direct integration utilizing the split-step fast-Fourier-transform method. The computations show that collisions are inelastic and that production of solitary waves may occur.

32804 **(DOE/ET/53088—88) Reduced magnetohydrodynamics and the Hasegawa-Mima equation.** Hazeltine, R.D. (Texas Univ., Austin (USA). Inst. for Fusion Studies). Apr 1983. Contract FG05-80ET53088. 22p. (IFSR—88). NTIS, PC A02/MF A01. Order Number DE83011262.

Reduced magnetohydrodynamics consists of a set of simplified fluid equations which has become a principal tool in the interpretation of plasma fluid motions in tokamak experiments. The Hasegawa-Mima equation is applied to the study of electrostatic fluctuations in turbulent plasmas. The relation between thee two nonlinear models is elucidated. It is shown tht both models can be obtained from appropriate limits of a third, inclusive, nonlinear system. The inclusive system is remarkably simple.

32805 **(GA-A—17073) Nonlinear theory of lower-hybrid-current drive: a two-dimensional Fokker-Planck study.** Chan, V.S.; Liu, C.S.; McClain, F.W. (GA Technologies, Inc., San Diego, CA (USA)). Apr 1983. Contract AT03-76ET51011. 20p. (CONF-830452—2). NTIS, PC A02/MF A01. Order Number DE83010956.

From Technical meeting on non-inductive current drive in tokamaks; Abingdon, UK (18 Apr 1983).

We demonstrate using a two-dimensional (in velocity) Fokker-Planck code that an electron distribution sustained by lower hybrid waves is unstable to magnetized plasma waves in a regime of experimental interest. We follow the temporal evolution of the distribution in the presence of these waves and obtain a physical picture of how fast electrons are generated and how these electrons gain a significant amount of perpendicular energy and sustain a large current.

32806 **(GA-A—17087) Minority ICRF current drive in toroidal devices.** Chan, V.S.; Chiu, S.C. (GA Technologies, Inc., San Diego, CA (USA)). Apr 1983. Contract AT03-76ET51011. 15p. (CONF-830452—1). NTIS, PC A02/MF A01. Order Number DE83010957.

From Technical meeting on non-inductive current drive in tokamaks; Abingdon, UK (18 Apr 1983).

To determine the plasma parameters that are necessary to produce an asymmetric k parallel spectrum required for asymmetric heating, we consider antennae coupling in a slab geometry. The antennae are treated as current filaments infinite in the y-(poloidal) direction and backed by a perfect conducting sheet. The density gradient is taken to be in the x-direction and we consider coupling only to the fast waves. The wave equation is solved using an outgoing wave condition for large x. We show the k/sub z/ spectrum for four antennae phased at $\theta = \pi/2$ for two different thicknesses of the low density region in front of the antenna. The asymmetry of the spectrum is quite sensitive to this thickness with a thicker low density region producing a more asymmetric spectrum.

32807 **(IPF—82-1) Development of high turbulent plasma states by exchange instabilities of m = 0 type.** Hayd, A.; Meinke, P.; Kaeppeler, H.J. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Plasmaforschung). Mar 1982. 32p. (In German). (CONF-8203111—1). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750250.

From Meeting on general problems in physics; Wuerzburg, F.R. Germany (1 Mar 1982).

Starting from the basic equations of magneto-plasma dynamics, the evolution of an instability is described from the linear to the non-linear region up to the turbulent state, using the computer code REDUCE: It is demonstrated how a m = 0 type exchange instability transforms to a turbulent state with an extremely large Reynolds number and high local fields B approx. equal to Re and densities n approx. equal to $\sqrt{Re}$. The theory is applied to describe the formation of a late turbulent state of the plasma focus, which is induced by the m = 0 instability. The model leads to a universal scaling constant for the plasma focus.

32808 **(IPP—III/74) Total radiation losses and energy balance for ohmically heated divertor discharges in ASDEX.** Mueller, E.R.; Behringer, K.; Niedermeyer, H. (Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). Dec 1981. 34p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750051.

Global energy balances were determined for different types of ohmically heated hydrogen discharges in the ASDEX divertor tokamak. The main radiation sources were identified by means of bolometric and spectroscopic diagnostics. In discharges with a poloidal stainless-steel limiter the total radiation in the main volume was the predominant energy loss channel. The radiation losses from the plasma centre, which are mainly due to iron, were reduced by means of the divertor by more than an order of magnitude to an amount which is only about 5% of the local heating power. Simultaneously, the volume-integrated total radiation losses were halved to values of between 22% and 32% of the total input power.

32809 **(Juel—1802) Real time 155 GHz millimeter wave interferometer module for electron density measurement in large plasma devices.** Huettemann, P.W.; Waidmann, G. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Plasmaphysik). Sep 1982. 30p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750389.

A homodyne, real time 155 GHz interferometer channel is described which is one module of a multichannel system for use on TEXTOR tokamak. A standing sine wave is generated in a phase bridge by transmitting a frequency modulated millimeter wave down two unequal interferometer branches. The presence of plasma produces a phase slip of the sine wave with respect to a reference signal. The phase shift is linear proportional to plasma density for expected TEXTOR plasmas. Long plasma paths give multiradian phase shifts which are recorded by a digital fringe counting system. The accuracy of phase measurement is $\Delta PHI = 2\pi/16$. Phase changes of $7\pi/8$ are accepted per modulation period. The microwave in the measurement branch of the interferometer is transmitted using a quasioptical technique. Components and technical details are described. The interferometer was tested in a simulation set-up and in two different plasma experiments. Experimental results are presented.

32810 **(LA-UR—83-1010) Current measurements by Faraday rotation in single-mode fibers.** Chandler, G.I.; Jahoda, F.C. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 11p. (CONF-830425—16). NTIS, PC A02/MF A01. Order Number DE83011318.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

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We have measured currents in the several-hundred-kiloamp range, with tens-of-nanoseconds risetime, in magnetic fusion devices using simple polarimetric techniques.

32811 (UCRL—15526) X-ray spectral line coincidences between fluorine VIII (and IX) and transition metal lines. Charatis, G.; Rockett, P.D.; Burkhalter, P.G. (KMS Fusion, Inc., Ann Arbor, MI (USA); Naval Research Lab., Washington, DC (USA)). 1983. Contract W-7405-ENG-48;AI08-79DP40092. 58p. NTIS, PC A04/MF A01. Order Number DE83012108.

X-ray spectroscopy was performed in the 12 to 15 A region, recording L-shell lines from selected laser-irradiated transition metals. Line coincidences and near coincidences were identified between Fe, Cr, Mn, and Ni L-spectra, and F VIII and F IX K-shell lines. Wavelengths were determined to accuracies of 1 to 3 mA and will be utilized in selecting potential pumping candidates in future x-ray lasing schemes. High-resolution x-ray spectra were collected under controlled illumination and target conditions using 1.05 μm and 0.527 μm laser excitation with the KMS CHROMA laser.

32812 Ion cyclotron heating in the Proto-Cleo stellarator. Hoffman, D.J. Madison, WI; Univ. of Wisconsin (1982). 180p. University Microfilms Order No. 82-14,736.

Thesis (Ph. D.).

Ion cyclotron waves were used to heat hydrogen plasma in the Proto-Cleo = 3, 7 field period stellarator. RF power was coupled to the net current-free plasma by a single-turn magnetic dipole antenna oriented to produce rf magnetic flux from the high field side of the plasma. Both ion and electron heating were observed - from 50-70 eV and 6 eV to 150 eV and 15 eV respectively. RF magnetic fields were seen to penetrate the plasma, both radially and toroidally. Particle confinement was not reduced by the rf for densities greater than 10^{13} cm^{-3}. However, thermal loss rates increased with rf heating, though the reduction in energy confinement seemed to be a result of particle heating and not of rf enhanced diffusion.

32813 Renormalized theory of drift wave turbulence in sheared magnetic fields. Similon P.L. Princeton, NJ; Princeton Univ. (1981). 213p. University Microfilms Order No. 82-03,232.

Thesis (Ph. D.).

A renormalized theory of drift wave turbulence in sheared geometry is formulated with the use of a systematic renormalization procedure: Kraichnan's direct-interaction approximation. Emphasis is laid on the need for a renormalized theory to preserve the energy conservation properties satisfied by the exact dynamical equations. The relation of energy conservation in a statistical theory to symmetries of the renormalized equations is discussed. Upon simplifying the direct-interaction approximation applied to a kinetic description of the electron dynamics, a simple Markovian renormalized theory is found which does satisfy the relevant form of energy conservation. The comparison with a previous non-energy-conserving theory shows that the latter over estimated the effect of turbulent destabilization. We derive and argue for a fluid-like description of the ion dynamics, which generalizes the Hasegawa-Mima equations by including finite gyro-radius effects and, more importantly, by containing appropriate energy sources (the resonant electrons coupled to the ions by the quasineutrality condition) and sinks (ion Landau damping, modelled by a parallel viscosity). The use of physically and empirically motivated approximation (e.g., the short correlation length approximation) on the fluid equations renormalized with the direct-interaction approximation, leads to closed systems of equations for calculating the evolution of the spectral intensity and the relaxation rate of the correlation function. This final formulation of the problem is suitable for numerical computation.

7002 Fusion Power Plant Technology

REFER ALSO TO CITATION(S) 31365, 32026, 32049

32814 (AD-A—121043/4) Measurements of laser coupling and plasma profiles in longer-scalelength plasmas. Memorandum report. Herbst, M.J.; Burkhalter, P.G.; Grun, J.; Obenschain, S.P.; Stamper, J.A. (Naval Research Lab., Washington, DC (USA)). 30 Sep 1982. 23p. NTIS, PC A02/MF A01.

Novel configuration of our two-beam laser allows laser-coupling experiments to be performed in longer-scalelength plasmas (Ln approx. equal to nc/10), which better simulate reactor-sized pellet plasmas. Preliminary observations show increased backscatter, as expected, but also reveal large reduction in 2 omega 0 and high-energy x-ray emissions. The latter may indicate lessened importance of resonance absorption in longer-scalelength plasmas. Measurements of plasma profiles are at least as important as coupling measurements in these experiments and we show new diagnostic techniques based upon tracer-dot methods. These include the first techniques available for velocity profile measurement, was well as an improved x-ray spectroscopic method for density and temperature profile measurement.

32815 (AD-A—121075/6) The POSEIDON electron beam generator. Final report. Sethian, J.D.; Mora, F. (Naval Research Lab., Washington, DC (USA)). 27 Sep 1982. 29p. NTIS, PC A03/MF A01.

The POSEIDON electron beam generator was designed to perform a series of experiments to produce a closed field line plasma confinement system with two rotating relativistic electron beams. Previous experimental studies have shown that a single rotating beam (generated by the TRITON electron beam generator) can produce a plasma in a reversed field configuration inside an initially field free metal tube. The magnetic fields were maintained with induced plasma currents rather than the beam electrons themselves. However, because the beam was injected from one end of the system, a net axial current persisted which precluded axial containment. To eliminate this current, it was proposed to inject a second rotating beam from the opposite end of the system.

32816 (AD-A—121472/5) Constraints on transportable ion beam power. Memorandum report. Ottinger, P.F.; Goldstein, S.A.; Mosher, D. (Naval Research Lab., Washington, DC (USA)). 12 Nov 1982. 33p. NTIS, PC A03/MF A01.

Constraints on transportable high ion beam power are investigated in order to determine the number of modules required for a multi-modular light-ion ICF system. Electrostatic and electromagnetic stability constraints are examined as well as channel expansion and energy loss considerations. It is found that less than ten modules are required to drive a high gain pellet if large radius transport channels are used in conjunction with beam bunching and final focusing.

32817 (AD-A—123643/9) Nonuniformities in laser-ablated plasma. Memorandum report. Herbst, M.J.; Stamper, J.A.; Lehmberg, R.H.; Whitlock, R.R.; Young, F.C. (Naval Research Lab., Washington, DC (USA)). 30 Dec 1982. 13p. NTIS, PC A02/MF A01.

With long pulse-duration (4 nsec), moderate intensity (approximately 10 to 13th power W/cm squared) Nd-laser illumination of planar targets, evidence is found in images of X-ray, 3/2 omega 0 and 2 omega 0 emission for filamentation of the incident beam. Calculations indicate that this may be due to thermal self-focusing of hot spots in the laser. x-ray images show spots and spicules, jets of material flow which appear to follow the fluid flow from the target. These may be attributed to the presence of microscopic impurities on our laser-irradiated foil targets.

32818 (ANL/FPP/TM—160) Fusion-component lifetime analysis. Mattas, R.F. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 81p. NTIS, PC A05/MF A01. Order Number DE83012461.

A one-dimensional computer code has been developed to examine the lifetime of first-wall and impurity-control components. The code incorporates the operating and design parameters, the material characteristics, and the appropriate failure criteria for the

individual components. The major emphasis of the modeling effort has been to calculate the temperature-stress-strain-radiation effects history of a component so that the synergystic effects between sputtering erosion, swelling, creep, fatigue, and crack growth can be examined. The general forms of the property equations are the same for all materials in order to provide the greatest flexibility for materials selection in the code. The individual coefficients within the equations are different for each material. The code is capable of determining the behavior of a plate, composed of either a single or dual material structure, that is either totally constrained or constrained from bending but not from expansion. The code has been utilized to analyze the first walls for FED/INTOR and DEMO and to analyze the limiter for FED/INTOR.

32819 **(CONF-811040—202) Liquid Li-Pb-Bi, a new tritium breeder.** Rogers, A.G.; Benedict, B.L.; Clemmer, R.G. (North Carolina State Univ., Raleigh (USA); Wisconsin Univ., Madison (USA); Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83010555.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In light of their potential utility as tritium breeder-blanket materials, a study was conducted to identify and characterize low-melting phases in the lithium-lead-bismuth system. It is found that a low-melting ternary phase field did in fact exist, e.g., compositions with $\leqq$ 20 atom percent lithium and Pb/Bi = 0.773 melted at or below 140°C. In addition, the qualitative reactivity of Li-Bi-Pb alloys with water was tested, and although minimal evidence of exothermic chemical reaction was observed, a physical vapor explosion did occur in one of the tests.

32820 **(CONF-811040—203) Solid oxide compounds properties necessary for fusion applications.** Finn, P.A.; Kurasawa, T.; Nasu, S.; Noda, K.; Takahashi, T.; Takeshita, H.; Tanifuji, T.; Watanabe, H. (Argonne National Lab., IL (USA); Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83010554.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An experimental program was conducted in collaboration with the staff at the Japan Atomic Energy Research Institute for the purpose of generating fusion pertinent thermophysical and chemical data on two ternary lithium oxides that have potential as tritium breeder materials, Li_2ZrO_3 and Li_2TiO_3. The four areas studied were: (1) fabrication, (2) thermal diffusivity/thermal conductivity, (3) compatibility with candidate structural alloys (HT-9, 316 SS, and Ni-plated 316 SS), and (4) tritium release behavior after irradiation. Where possible, the behavior of these materials was compared with lithium oxide.

32821 **(CONF-820758—) National rf technology research and development program plan.** (Oak Ridge National Lab., TN (USA)). May 1983. Contract W-7405-ENG-26. 191p. NTIS, PC A09/MF A01. Order Number DE83011060.

From National RF technology research and development program conference; Gaithersburg, MD, USA (13 Jul 1982).

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This plan was prepared by the Oak Ridge National Laboratory at the request of the Office of Fusion Energy, Division of Development and Technology, to define the technology development needs and priorities. The US rf research and development community, with a wide representation from universities, laboratories and industries, participated in many discussions, meetings and in a three-day workshop in developing the needs and priorities definition. This very active and effective involvement of the rf leaders from all of these groups was an essential feature of the activity and results in the plan representing a broad consensus from the magnetic fusion energy development community. In addition, a number of scientists from Japan and Europe participated by providing data.

32822 **(CONF-830406—27) Experimental database and design concept for a 1-MW, 200-keV neutral-beam line based on a SITEX negative ion source.** Dagenhart, W.K.; Gardner, W.L.; Stirling, W.L.; Whealton, J.H. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE83011389.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

Scaling studies for a SITEX negative ion source to produce 200-keV, 10-A, long pulse D^- beams are under way at Oak Ridge National Laboratory (ORNL). Designs have been restricted to the use of established techniques and reasonably well-demonstrated scaling. The results show that the 1-A SITEX source can be directly scaled to produce 200-keV, 10-A long pulse ion beams with a source power efficiency of $\leqq$ 5 kW of total plasma generator power per ampere of D^- beam generated. Extracted electron-to-D^- ratios should be $\leqq$ 0.06, with all extracted electrons recovered at $\leqq$ 10% of the first gap potential energy difference. The close-coupled accelerating structure will be 5 cm long and have five electrodes with 21 slits each, with a 50-kV/cm field in each gap.

32823 **(CONF-830406—28) Development of a long-pulse (30-s), high-energy (120-keV) ion source for neutral-beam applications.** Tsai, C.C.; Barber, G.C.; Blue, C.W. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE83011392.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

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Multimegawatt neutral beams of hydrogen or deuterium atoms are needed for fusion machine applications such as MFTB-B, TFTR-U, DIII-U, and FED (INTOR or ETR). For these applications, a duoPIGatron ion source is being developed to produce high-brightness deuterium beams at a beam energy of $\sim$ 120 keV for pulse lengths up to 30 s. A long-pulse plasma generator with active water cooling has been operated at an arc level of 1200 A with 30-s pulse durations. The plasma density and uniformity are sufficient for supplying a 60-A beam of hydrogen ions to a 13- by 43-cm accelerator. A 10- by 25-cm tetrode accelerator has been operated to form 120-keV hydrogen ion beams. Using the two-dimensional (2-D) ion extraction code developed at Oak Ridge National Laboratory (ORNL), a 13- by 43-cm tetrode accelerator has been designed and is being fabricated. The aperture shapes of accelerator grids are optimized for 120-keV beam energy.

32824 **(CONF-830406—29) rf coupler technology for fusion applications.** Hoffman, D.J. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE83012041.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

Radio frequency (rf) oscillations at critical frequencies have successfully provided a means to convey power to fusion plasmas due to the electrical-magnetic properties of the plasma. While large rf systems to couple power to the plasma have been designed, built, and tested, the main link to the plasma, the coupler, is still in an evolutionary stage of development. Design and fabrication of optimal antennas for fusion applications are complicated by incomplete characterizations of the harsh plasma environment and of coupling mechanisms. A brief description of rf coupler technology required for plasma conditions is presented along with an assessment of the status and goals of coupler development.

32825 **(CONF-830406—30) Technology of neutral-beam injection based on positive-ion sources.** Menon, M.M. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 8p. NTIS, PC A02/MF A01. Order Number DE83011399.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

Advances made in each of the following areas are summarized: (1) long pulse plasma sources, (2) the arc discharge, (3) the atomic species, (4) impurities, (5) accelerator development, (6) beam line components, and (7) the role of positive-ion-based injection systems for reactor-size devices. (MOW)

32826 (CONF-830406—32) Monte Carlo calculations of neutron and gamma-ray energy spectra for fusion reactor shield design: comparison with experiment. Santoro, R.T.; Barnes, J.M. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE83011394.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

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Neutron and gamma-ray energy spectra resulting from the interactions of ~ 14 MeV neutrons in laminated slabs of stainless steel type-304 and borated polyethylene have been calculated using the Monte Carlo code MCNP. The calculated spectra are compared with measured data as a function of slab thickness and material composition and as a function of detector location behind the slabs. Comparisons of the differential energy spectra are made for neutrons with energies above 850 keV and for gamma rays with energies above 750 keV. The measured neutron spectra and those calculated using Monte Carlo methods agree witin 5% to 50% depending on the slab thickness and composition and neutron energy. The agreement between the measured and calculated gamma-ray energy spectra are also within this range. The MCNP data are also in favorable agreement with attenuated data calculated previously by discrete ordinates transport methods and the Monte Carlo code SAM-CE.

32827 (CONF-830406—33) Poloidal field superconducting ring coil case and support structure design. Hooper, R.J.; Hunter, B.L. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE83011395.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

Conceptual design studies have been carried out at the Fusion Engineering Design Center (FEDC) on a succession of tokamak devices. In order to quickly assess the technical feasibility and to estimate the costs of competing poloidal field (PF) systems, it is desirable to develop simple, but accurate, rules for the structural design of these coils. In this paper we describe the rules developed for superconducting ring coils and illustrate their application to a specific example. This methodology may be easily adapted to resistive ring coil design.

32828 (CONF-830406—34) Radio-frequency energy in fusion power generation. Lawson, J.Q.; Becraft, W.R.; Hoffman, D.J. (Princeton Univ., NJ (USA). Plasma Physics Lab.; General Electric Co., Schenectady, NY (USA); Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE83012067.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

The history of radio-frequency (rf) energy in fusion experiments is reviewed, and the status of current efforts is described. Potential applications to tasks other than plasma heating are described, as are the research and development needs of rf energy technology.

32829 (CONF-830406—35) Nondestructive testing of metallic sheath for internally cooled superconductor. McClung, R.W.; Cook, K.V.; Dodd, C.V.; Smith, J.H. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE83011397.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

For quality assurance in the Oak Ridge National Laboratory Large Coil Program, we developed ultrasonic and eddy-current techniques to examine the JBK-75 alloy sheath for superconducting cable for a large magnet. Ultrasound was used to examine the strip before forming into the sheath, and eddy currents were used to examine the seam weld after the sheath had been formed around the cable.

32830 (CONF-830406—36) Assessment of energetic ion rings versus electron rings for an EBT reactor. McBride, J.B.; Uckan, N.A.; Kashuba, R.J. (Science Applications, Inc., La Jolla, CA (USA); Oak Ridge National Lab., TN (USA); McDonnell Douglas Corp., St. Louis, MO (USA)). 1983. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE83011401.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

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This paper summarizes the results of a preliminary assessment of energetic ion rings for use in an ELMO Bumpy Torus (EBT) reactor. The properties of ion rings are compared with those of electron rings. Ion rings appear to require sizable devices and magnetic field strengths for stable, adiabatic confinement. Stable windows for steady-state ion ring operation having acceptable power requirements, determined mainly by Coulomb drag on the background electrons, appear to exist for EBT reactors. Power requirements for ion rings can be quantitatively lower than those for electron rings, provided the ion ring volume does not greatly exceed the electron ring volume. Some stability properties of ion rings are also discussed. Results of parametric trade-off studies for ion rings versus electron rings using an EBT reactor systems code are presented.

32831 (CONF-830609—6) Tritium diffusion in lithium oxide solid breeder materials. Shearer, J.A.; Tam, S.W.; Johnson, C.E. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007594.

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

A review of data of tritium diffusion in Li_2O is presented. Also diffusion coefficients in Li_2O of tritium, lithium, oxygen, hydrogen, and deuterium are given. (MOW)

32832 (CONF-8010203—3) Beam brightness in low-beta linacs: a sensitivity study. Burke, R.J.; Sacks, R.A. (Argonne National Lab., IL (USA); Science Applications, Inc., Oak Brook, IL (USA)). 1980. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83010742.

From Heavy ion fusion workshop; Berkeley, CA, USA (29 Oct 1980).

Heavy ion drivers for inertial-confinement fusion reactors depend on the ability to produce a high-intensity, high-quality beam with a minimum of in-machine loss. Deterioration of the beam quality, which subsequently leads also to beam loss, tends to occur in the early (low energy) stages of the acceleration process, since all nonlinear effects decrease with velocity. The current work does not directly address the specific causes for beam deterioration on a fundamental level. Rather, we present the results of a numerical study aimed at gaining an engineering characterization of the dependence of the accelerated beam quality and intensity on various parameters in the linac design, the initial beam configuration, and the initial current. A dramatic improvement is observed when injection energy is raised, and some tentative suggestions are offered for techniques of achieving this increase.

32833 (CONF-8110118—) Third neutral-beam-heating workshop: proceedings. (Oak Ridge National Lab., TN (USA)). 1981. Contract W-7405-ENG-26. 601p. NTIS, PC A99/MF A01. Order Number DE83006388.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

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Separate abstracts were prepared for each of the 49 included papers. (MOW)

32834 (CONF-8110118—, pp 35-42) Rectangular area hollow cathode ion sources. Goebel, D.M.; Forrester, A.T. (Univ. of California, Los Angeles). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Several improvements have been made in the UCLA 10cm x 40cm extraction area, hollow cathode, magnetic multipole ion source in preparation for high voltage testing on the LBL 120kV

accelerator system. A modification in the hollow cathode feedthrough has enhanced the reliability of the discharge and decreased the cathode conditioning time. The addition of extra anode area has stabilized the discharge against mode shifts and increased the range of gas pressures at which the plasma generator will operate. The ion source now produces 0.08 to 0.3 A/cm² of deuterium ions to the accelerator area at a constant gas throughput of about 16.5 torr-liters per second. The electrical efficiency of the plasma generator is 1.26 A/kW over this range, assuming 60% of the ions are extracted. The plasma uniformity is adequate for turn on of the accelerator voltage and improves with ion extraction. The high atomic species output, low noise, long lifetime, and improved discharge performance of this ion source make it a viable candidate for development in future neutral beam lines.

32835 (CONF-8110118—, pp 43-53) **Electron emission from non-inductive hair-pin shaped filament.** Matsuoka, M.; Ohara, Y.; Okumura, Y.; Tanaka, S. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

32836 (CONF-8110118—, pp 55-65) **Estimation of life time of directly heated tungsten filament in gaseous discharges.** Tanaka, S.; Matsuoka, M. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Providing that the temperature distribution along the filament is in the steady state, we determined the maximum temperature of the tungsten at that temperature. With increasing $k\beta$, the life time of the filament rapidly decreases, where k is the ratio of the emission current to the filament current, and β is the fraction of the discharge current which flows through the maximum temperature point of the filament.

32837 (CONF-8110118—, pp 113-117) **Electrostatic separation of ions in a bucket source with magnetic filter.** Green, T.S.; Cottrell, G.A. (Culham Lab., Abingdon, England). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

We consider how ions with different temperatures may be selectively filtered by an electrostatic barrier which can exist in a magnetic multipole (Bucket) source equipped with a magnetic filter. The H^+ ions have a greater temperature than the H_2^+ and H_3^+ species and so can cross the electrostatic barrier with less sttenuation than the molecular species. We suggest that low temperature impurity ions may also become trapped in the rear chamber of the source, thus leading to an improvement in source performance.

32838 (CONF-8110118—, pp 119-129) **Effect of a magnetic filter on hydrogen ion species in a multicusp ion source.** Ehlers, K.W.; Leung, K.N. (Lawrence Berkeley Lab., CA). 1981. NTIS, PC A99/MF A01. Contract W-7405-ENG-48.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Hydrogen ion species and discharge characteristics have been compared for two different magnet geometries in a multicusp ion source. One magnet configuration indicated that the H_3^+ ion percentage in the extracted beam could be reduced by eliminating the high energy ionizing electrons near the ion extraction region. To accomplish this and maintain the desired features of both magnet geometries, a magnetic filter was installed near the source exit. With this combined arrangement, we found that the H^+ ion percentage and discharge condition were much improved and a more uniform profile across the extraction plane was achieved. The atomic species fraction can then be further enhanced by the addition of low energy ($\sim$ 16 eV) primary electrons into the source plasma chamber.

32839 (CONF-8110118—, pp 131-144) **Atomic species improvements in the 10 x 10 cm² filter bucket.** Pincosy, P.A.; Ehlers, K.W. (Lawrence Berkeley Lab., CA). 1981. NTIS, PC A99/MF A01. Contract W-7405-ENG-48.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

It has been demonstrated with small test geometries and at reduced plasma densities, that the additionof a magnetic filter to a conventional multi-line cusp plasma source can enhance the percentage of extracted atomic hydrogen and deuterium ions. By modifying an existing quarter-scale (10 x 10 cm ion extraction area) multi-line cusp source to include a magnetic filter, we have extended these results to larger area sources operating at higher extraction current densities.

32840 (CONF-8110118—, pp 145-148) **Measurement of impurities in intense ion beams.** Okumura, Y.; Ohara, Y. 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Impurity concentration in intense ion beams extracted from a 70 keV/5 A/10 s ion source (duoPIGatron or Bucket-type) and a 75 keV/35 A bucket source (full-scale or 1/6-size) has been measured by magnetic deflection mass analyzer.

32841 (CONF-8110118—, pp 159-169) **10 x 40 hybrid magnetic bucket operation.** Lietzke, A.F. (Lawrence Berkeley Lab., CA). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The magnetic multi-cusp-line arc chamber increased the atomic fraction of the neutral beam above the conventional anode arc chamber but operation was more difficult. The deficiencies and advantages of each style led to their marriage (for a proof-of-principle) where greatly imporved operability and slightly improved species have been achieved at the expense of power efficiency. Obvious simplifications and re-raising the power efficiency are planned for the TFTR and MFTF prototypes.

32842 (CONF-8110118—, pp 177-196) **New high power beam dump techniques.** Dagenhart, W.K. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Basic techniques have been developed at Oak Ridge National Laboratory (ORNL) to alleviate the problems of dumping ion and/or neutral beams with high power densities. One technique lowers the time-averaged power density on the ion dump by raster scanning the beam in two directions. Scanning is achieved by independently modulating the current in each of the coils at the deflection magnet pole tips. Another technique lowers the time-averaged beam power densities on neutral beam targets by partially reionizing the neutral beam and then spatially averagint the ion beam impact pattern, using suitable time-dependent and spatially modulated magnetic field distributions. These techniques can be used for efficient beam dumping on all future beam lines in structures of reasonable size and cost. Existing water systems and magnet technology can be used with these systems, which also extend the fatigue life of the dump panels by greatly reducing the time-averaged power density that the panels must tolerate. Thus, these techniques reduce the need to develop high technology heat transfer equipment for neutral beam lines.

32843 (CONF-8110118—, pp 197-207) **Countermeasure for unneutralized ion beam in JT-60 NBI against the leakage magnetic field from JT-60.** Matsuoka, M.; Itoh, T.; Horiike, H.; Matsuda, S.; Tanaka, S. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Unneutralized ion beam in JT-60 neutral beam injector will be magnetically bent by the reflecting magnet and will impinge on the surface of the water jacket protecting the magnet and on the surface of the ion beam dump. When the JT-60 tokamak operates, leakage magnetic field generated by the poloidal currents will be superposed on the above magnetic field. As a result, the trajectory of the ion beam will be displaced and the heat loading of the water jacket and the ion beam dump will exceed a permissible level unless careful attention is paid to the magnetic field design. As one of the countermeasures against the leakage field, we first considered the

magnetic shielding. After the numerical and experimental study, however, it was found difficult to obtain the satisfactory shielding factor due to lack of space. As another countermeasure, the cancellationof magnetic field by a set of additional coils (calcellation coils) was proposed and studied. The result showed that the cancellation was effective to reduce the leakage field to a sufficiently low value. Therefore we decided to adopt it in the JT-60 NBI. Here we describe the design of cancelling coils and its effect conformed by numerical simulation and measurement with a quarter model of magnetic material and coils.

32844 (CONF-8110118—, pp 209-212) **Calculation of heat flux density on the surface of beam dump.** Itoh, T. 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

32845 (CONF-8110118—, pp 213-224) **Burnout experiment.** Horiike, H.; Kuriyama, M. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

32846 (CONF-8110118—, pp 225-237) **Beam stops of the prototype injector unit.** Kuriyama, M.; Araki, M.; Mukaida, H.; Shibanuma, K. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

32847 (CONF-8110118—, pp 243-252) **Experimental results of the ORNL energy recovery experiment, 1981.** Ryan, P.M. (Oak Ridge National Lab., TN); Barber, G.C.; Dagenhart, W.K.; Feezell, R.R.; Ponte, N.S.; Stirling, W.L.; Whealton, J.H.; Gardner, W.L.; Schechter, D.E.; Tsai, C.C. 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The ORNL 40 keV Energy Recovery experiment was repaired after a water-line freeze up in the summer of 1980 and was operated in early 1981. This report describes how this version differs from its predecessors, most notably in the power supply configuration, and presents experimental results. Experimental difficulties that prevented operation at previously enjoyed levels are recounted. Improvements in diagnostics include the ability to monitor currents striking selected ion collection surfaces.

32848 (CONF-8110118—, pp 253-257) **Magnetic blocking direct recovery efficiency for intense neutral beams.** Whealton, J.H.; Wooten, J.W.; McGaffey, R.W. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The ion recovery efficiency of a transverse magnetic field monochromatic direct recovery device intended for intense neutral beams is examined theoretically by solving a Poisson-Vlasov equation. An optimum in recovery efficiency is obtained for finite ion current density and excess initial speed.

32849 (CONF-8110118—, pp 265-269) **1000 Amp filament power supply.** Wright, R.E. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A 15 V, 1000 A power supply was developed to supply filament power to the Oak Ridge multiple filament rectangular ion source. The power supply can operate steady state or in a pulsed mode to furnish filament heating for the ion source. The power supply is capable of maintaining an idling current to the filaments between extraction pulses to reduce the electron emission and heat dissipation to enhance the lifetime of the filaments. Prior to an ion beam extraction pulse, the filament current is increased from the idling current to full operating current; ion beam extraction commences when the filament emission reaches equilibrium. When the extraction terminates, the filament current is returned to the idling state.

32850 (CONF-8110118—, pp 277-292) **Measurements of negative hydrogen ion production rate by volume processes in a magnetic multipole ion source.** Green, T.S.; Holmes, A.J.T.; Walker, A.R. (Culham Lab., Abingdon, England). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The possibility of efficient neutral injection systems for fusion research at high particle energies may depend mainly on the development of ion sources based on negative ions. In this report we describe initial experiments on H^- studies in a magnetic multipole ion source. Measurements have been made of the flux of negative particles with a small probe mounted in the anode of the source between the cusps formed in the magnetic field configuration. The data are compared with an analytical model for H^- production based on the work of Bacal et al.

32851 (CONF-8110118—, pp 293-305) **Measurement of the decay rate of negative ion currents in a magnetic multipole source.** Holmes, A.J.T.; Green, T.S.; Walker, A.R.; Inman, M. (Culham Lab., Abingdon, England). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Recent experiments have shown that negative hydrogen ions are created in ion sources with sufficient probability to contribute significantly to both the particle density and the efflux of ions to the walls of the source. In this report we describe measurements of the decay rate of negative ion density at the walls of a magnetic multipole source which substantiate theoretical models of the mechanisms by which these ions are created in the source.

32852 (CONF-8110118—, pp 317-328) **SITEX negative ion source scaling studies to produce 200-keV, 10-A, long pulse D^- beams.** Dagenhart, W.K.; Gardner, W.L.; Kelley, G.G.; Stirling, W.L.; Whealton, J.H. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Scaling studies for a SITEX negative ion source that will produce 200-keV, 10-A, long pulse D^- beams are being carried out at ORNL. For the first concept presented here, designs were restricted to the use of established techniques and reasonably well demonstrated scaling. The results show that the present 1-A SITEX source can be directly scaled to produce 200-keV, 10-A, long pulse ion beams. The source power efficiency would be $\leq$ kW of total plasma generator power per ampere of D^- beam generated. Extracted electron-to-D^- ratios of $\leq$ 0.06 are expected, with all extracted electrons recovered at an energy of $\leq$ 10% of the first gap potential energy difference. The close-coupled accelerating structure will be 5 cm long and have five electrodes with 21 slits each, with a 50-kV/cm field in each gap. No decel electrode was included because of the transferse magnetic field. Electrons formed in each gap by the $\sim$ 16% charge exchange loss of D^- in the total accelerator column will be collected by electron recovery structures associated with the gaps at a maximum energy of each gap's potential energy difference. Atomic gas efficiency will be $\geq$ 67%. The first beam divergence calculations using the ORNL optics code resulted in $\theta = +\text{-}\ 0.4°$.

32853 (CONF-8110118—, pp 329-331) **Improvement of gas efficiency of negative ion sources.** Whealton, J.H. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A modification of the currently operating Calutron, magnetron, and modified duoPIGatron negative ion source is proposed; the modification should improve gas efficiency by more than an order of magnitude in the Calutron, a factor of 5 in the magnetron, and a factor of 2 in the duoPIGatron.

32854 (CONF-8110118—, pp 343-353) **Design concept for a 200-keV, 10-A negative ion based neutral beam system.** Gardner, W.L.; Dagenhart, W.K.; Kelley, G.G.; Stirling, W.L.; Whealton, J.H. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Herein is described a 200-keV, 10-A, steady-state neutral beam system based upon small extrapolations to and scaling of current negative ion source work being conducted at Oak Ridge National Laboratory (ORNL). The discussion includes our design philosophy, general systems considerations, and a description of the system design.

32855 (CONF-8110118—, pp 361-369) **Ion extraction and optics arithmetic.** Whealton, J.H. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Arithmetic algorithms for ion extraction from a plasma are examined, instabilities are delineated, and ancillary results are presented.

32856 (CONF-8110118—, pp 371-372) **Effect of slot ends on ion extraction optics.** Wooten, J.W.; Whealton, J.H.; McCollough, D.H. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A preliminary result is given for the transverse and longitudinal root mean square divergence angles for an ion beam traversing a sample finite slot accelerator design. The result is obtained using a finite element code to achieve a three-dimensional explicit solution for the extraction sheath resulting from the solution of the Poisson Vlasov equation. This is the first three-dimensional explicit sheath solution for a possible neutral beam accelerator electrode design.

32857 (CONF-8110118—, pp 373-383) **Triode and tetrode extraction systems for 160 keV neutral injectors.** Raimbault, P. (Association Euratom-CEA sur la Fusion, Fontenay-aux-Roses, France). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Acceleration of ions at energies higher than 100 keV are necessary in large tokamaks for neutral injection heating with deuterium. It is important to determine, at equal beam optical qualities, which type of accelerating structure will give maximum reliability, will minimize power loading problems and will allow one to deliver reasonable current densities at these energy levels. Based on recent experimental results at 80 keV and extrapolation made by computer simulation, we show that a triode system with shaped circular apertures can be better adapted to very high voltage operation than existing types of circular aperture tetrode systems. If voltage hold off scalings between electrodes are very unfavorable the best alternative is a tetrode system with equally stressed gaps which was seen, with an appropriate design of electrodes, to deliver adequate beam optics.

32858 (CONF-8110118—, pp 385-397) **Measurements of beam emittance and divergence for a high power ion beam using a magnetic analyser.** Green, T.S.; Martin, A.R.; Holmes, A.J.T.; Padgett, C. (Culham Lab., Abingdon, England). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The efficient transport of high power neutral beams into the restricted access of tokamak plasmas requires that the particle beams should have a low angular divergence. Experimental studies by Holmes and Cottrell and Holmes have shown that very low divergences (~ 0.5°) can be achieved in four electrode extraction systems at 80 kV extraction voltage for 1 to 6 apertures. These data indicate that the divergence is close to the emittance limited value. In these studies calorimeter measurements of the beam profile have been augmented by measurements of the emittance diagram profile using a simple emittance probe, with a moveable defining slit and a moveable Faraday cup collector. In this note we report on data obtained using an emittance probe based on magnetic deflection analogous to that used in determination of the emittance diagram of beams in accelerators.

32859 (CONF-8110118—, pp 399-414) **Comparison between cylindrical or shaped apertures for a three-grid neutral beam injector.** Bonnal, J.F.; Druaux, J.; Fois, M.; Oberson, R.; Tual, D. (Association Euratom, Fontenay-aux-Roses, France). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A numerical simulation was used to optimize a shaped aperture geometry. In order to allow a meaningful comparison with cylindrical apertures, we set ourselves to build grids and to test them in the most possible similar conditions than for ASDEX sources. Thus the useful diameters of the grids are the same (phi 16 cm), the distance between first and second electrodes too (7.3 mm) and the measurements have been made on the same test stand, with the same equipment and diagnostics.

32860 (CONF-8110118—, pp 415-431) **Computer simulation of power loading on electrodes in high energy triode and tetrode extraction systems.** Raimbault, P. (Association Euratom, Fontenay-aux-Roses, France). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Present neutral injection lines should deliver high power densities for long pulse lengths. The most critical part in these systems appears to be the accelerating structure which is particularly sensitive to power loading effects. A triode and a tetrode system which have been proposed for the JET injectors and experimented on test beds, are analyzed here in this respect. The numerical study shows that the tetrode system at low Γ values and the triode system have similar power loading characteristics. However we have found increased electrode interception in the tetrode system at the higher Γ values which were specified for this system. This was confirmed by recent experimental results at FAR.

32861 (CONF-8110118—, pp 433-442) **Energy straggling in an ion accelerator.** Tsai, C.C. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

For neutral beam applications, an ion source that can produce ion beams with an atomic fraction of 90% is highly desirable. However, even if a beam consisting entirely of atomic ions emanated from the source plasma, ion-molecule collision processes in the accelerator would introduce molecular ions and other fast particles, resulting in a straggling of beam energy and lowering the full-energy atomic fraction in the beam. To illustrate the seriousness of this effect, first-order calculations are performed for three gas throughputs into an ion source. Other undesirable effects, associated with beam particle interactions in the accelerating region, on drain current, beam power efficiency, and backstreaming electron production are discussed. Minimizing the accelerator column length and improving the gas efficiency are obvious routes to relieve the problem; another possible remedy is the use of hot atoms in the plasma generator.

32862 (CONF-8110118—, pp 443-449) **Primary ion tetrode optics for high transparency multibeamlet neutral injectors.** Whealton, J.H. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A number of tetrode electrode designs are considered. An improvement resulting in 425% more brightness with 26% less source plasma is suggested from the results of solutions of the Poisson-Vlasov equations.

32863 (CONF-8110118—, pp 451-454) **Ion beam extraction from a plasma with aberration reduction by method of mutual exclusion.** Whealton, J.H.; McGaffey, R.W.; Stirling, W.L. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Using an algorithm for solution of the Poisson-Vlasov equations for ions extracted from a plasma, an electrode shape is considered which has high optimum perveance and low beam divergence.

32864 (CONF-8110118—, pp 459-463) **Cooled neutralizer gas-cells.** Hemmerich, J.L. (Kernforschungsanlage Juelich GmbH, Germany); Deksnis, E.B. 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Recent experiments on scale-model neutralizers suggest that for pressures in the operating range of plasma sources in a neutral-beam injector temperature of the duct walls influences conductance. Tandem neutralizers, front/plasma-source end cooled, rear end heated can achieve gas-targets comparable to those for standard gas-cells with a greatly lower through-put of gas.

32865 (CONF-8110118—, pp 465-469) **Effect of streaming gas in a neutral beam injector.** Feist, J.H.; Staebler, A. (Max-Planck-Institut fuer Plasmaphysik, Garching, Germany). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Experimental data and computer simulation for the pressure behavior in the NBSTF and the ASDEX beam line are compared. It is shown that one has to modify pure molecular flow calculations by including streaming gas components, in order to reproduce the data.

32866 (CONF-8110118—, pp 471-473) **Conductances of accelerator and neutralizer cell.** Okumura, Y.; Ohara, Y. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Conductances of the accelerator and the neutralizer cell have been measured for hydrogen gas. When the ion source is not driven, the conductances are in good agreement with calculated values if one considers the streaming effect which occurs in case the accelerator grids setted closely. When the ion source is driven, the amount of gas corresponding to ion beam is transported rapidly. The conductance of accelerator increases by about 10%. This is considered to be due to increase of the gas temperature. The conductance of the neutralizer cell scarcely changes.

32867 (CONF-8110118—, pp 475) **Experiment of long pulse beam injection into cryopump.** Shibata, T.; Okumura, Y.; Shibanuma, K. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

32868 (CONF-8110118—, pp 483-504) **Properties of an intense 50-kV neutral beam injection system.** Gardner, W.L. (Oak Ridge National Lab., TN); Barber, G.C.; Blue, C.W. 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The properties of an intense 50-kV neutral beam system are discussed. The salient features of this system are a transmission efficiency of 76% of the extracted ion beam through a 30 x 34 cm aperture that is 4.5 m from the ion source, a transmitted neutral power of 1.8-MW H^0 (2.0-MW D^0) at extraction parameters of 50 kV/100 A/0.1 s (53 kV/85 A/0.1 s), a proton fraction of $\sim$ 80%, an ion source arc efficiency of $\sim$ 1.3 A/kW, an ion source gas efficiency of $\sim$ 35%, and a reliability of $\geq$ 90%.

32869 (CONF-8110118—, pp 505-515) **Initial operation and performance of the PDX neutral beam injection system.** Kugel, H.W.; Eubank, H.P.; Kozub, T.A.; Rossmassler, J.E.; Schilling, G.; Von Halle, A.; Williams, M.D. (Princeton Univ., NJ). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

In 1978, the Princeton Large Torus (PLT) achieved a record ion temperature of 6.5 keV using 2.4 MW of D neutral beams injected tangent to the plasma axis. At that time work was already in progress at PPPL and ORNL on the much larger injection systems for the Poloidal Divertor Experiment (PDX). The PDX is a tokamak designed to study impurity control via magnetic divertors in high density, high temperature plasmas using neutral beam sources developed at ORNL. In 1981, the joint ORNL/PPPL PDX neutral beam heating project succeeded in reliably injecting 8 MW of D^0 at the PDX plasma, at nearly perpendicular angles, and achieved ion temperatures of 5.8 keV at plasma densities 1.5 to 2 times greater than those of the PLT conditions. The expeditious achievement of this result was due to the thorough conditioning and qualification of the PDX neutral beam ion sources at ORNL prior to delivery coupled with several field design changes and improvements in the injection system made at PPPL as a result of neutral beam operating experience with the PLT tokamak. It has been found that the operation of high power neutral beam injection systems in a tokamak-neutral beam environment requires procedures and performance different from those required for development operation on test stands. In this paper, we review the installation of the PDX neutral beam injection system, and its operation and performance during the initial high power plasma heating experiments with the PDX tokamak.

32870 (CONF-8110118—, pp 517-528) **Initial operation of Doublet III neutral beam injectors.** Kim, J.; Beal, J.W.; Colleraine, A.P. (General Atomic Co., San Diego, CA). 1981. NTIS, PC A99/MF A01. Contract AT03-76ET51011.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Preliminary results of initial operation of Doublet III neutral beam injectors are presented with an emphasis on discussion of actual performance of key design features.

32871 (CONF-8110118—, pp 529-534) **Prototype ion source for JT-60 NBI.** Tanaka, S.; Akiba, M.; Horiike, H. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The prototype ion source for JT-60 NBI has been fabricated and tested. An ion beam of 75 keV/35 A has been extracted for a duration of 0.1 sec through 12cm x 27cm extraction grids. Using the 1/6-section of the grids, longer pulse beams of 70 keV/6 A have also been extracted for 10 sec. To solve the problem of thermal stress (or plastic deformation) of copper grid, we chose molybdenum as grid material. The molybdenum grid is cooled by 44 cooling pipes, each of which is buried and brazed between two adjacent rows of apertures.

32872 (CONF-8110118—, pp 535-541) **Construction of prototype injector unit for JT-60.** Kuriyama, M.; Akiba, M.; Araki, M. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A prototype neutral beam injector unit for JT-60 has been constructed prior to fabrication of 14 injector units for JT-60 to confirm system performances of a beam line and a power supply units. Basic performance for the prototype unit is an injection power of 1.5MW neutral hydrogen atoms at 75kV, up to 100 kV, with a pulse length of as long as 10 sec for every 600 seconds. The prototype unit has been already fabricated and installed in JAERI and is now under testing. The total system of the unit will be completed by the end of October 1981.

32873 (CONF-8110118—, pp 543-546) **Prototype ion source for JT-60 neutral beam injectors.** Akiba, M. (Japan Atomic Energy Research Inst., Tokai, Ibaraki). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A prototype ion source for JT-60 neutral beam injectors has been fabricated and tested. Here, we review the construction of the prototype ion source and report the experimental results about the source characteristics that has been obtained at this time. The prototype ion source is now installed at the prototype unit of JT-60 neutral beam injection units and the demonstration of the performances of the ion source and the prototype unit has just started.

32874 (CONF-8110118—, pp 549-562) **High energy high current neutral beam injector operation with single-stage and two-stage multiaperture extraction systems.** Fumelli, M.; Bariaud, A.; Becherer, R.; Desmons, M.; Raimbault, P. (C.E.N., Fontenay-aux-Roses, France). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

A three electrode extraction system, for 80 keV operation was developed, which was based on the standard triode concept, but takes advantage of the additional room between apertures necessary for water cooling, to give a pseudo-Pierce shape to the plasma electrode and thus produce beams with good optics. This system has been operated up to 40 A extracted ion beam at 80 keV energy. We have also, after these experiments, operated the injector with a two stage extraction system developed at Culham Laboratory and which was intended for J.E.T. injectors. Some significative results of the study (which cover over two years of experimental work) of these two different extraction systems are presented and discussed.

32875 (CONF-8110118—, pp 563-569) **Neutral injectors for the Wendelstein VII-A stellarator: reliability, impurities.** Ott, W. (Max-Planck-Institut fuer Plasmaphysik, Garching, Germany). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The injectors for the W VII-A experiment have been made more reliable. The improvements which were necessary are briefly described. The main problem in the experiment has become radiation from plasma impurities which may be caused by beam impurities. The deleterious effect of trace impurities in the neutral beams on the plasma has been demonstrated.

32876 (CONF-8110118—, pp 571) **Performance of the ASDEX neutral beam injector.** Staebler, A.; Vollmer, O.; Baeumler, H. (Max-Planck-Institut fuer Plasmaphysik, Garching, Germany). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

32877 (CONF-8110118—, pp 595-606) **Breakdown studies for neutral injectors.** Bottiglioni, F.; Bussac, J.P. (Association Euratom, Fontenay-aux-Roses, France). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Reliable operation of high energy neutral injectors is challenged by the voltage hold-off capability of the extraction systems. The high voltage behavior of a gap depends not only on a large number of macroscopic parameters, e.g. the electrodes material, geometry, separation, and residual gas pressure, but also upon dimly defined and badly controlled microscopic electric properties such as electrodes surface conditions, which are in turn affected by the conditioning procedures and by the operational history of the gap. In fact, it is merely due to the microscopic surface conditions of electrodes, especially cathodes, that for most favorable regimes, macroscopic breakdown fields are two orders of magnitude lower than what can be expected from the field emission theory ($E \geq 3\ 10^9$ V/m). At FAR, experimental data on the voltage hold-off problems are obtained in a large injector (Megawatt Beam Line - MWBL) and in L.E.O., a smaller but more flexible facility where single beam studies will be made, up to 160 keV. Some results are described.

32878 (CONF-8110118—, pp 611-626) **Physics design calculations for the JET neutral injection system.** Hemsworth, R.; Goede, A.; Neilsen, B.; Thompson, E. (JET Joint Undertaking, Abingdon, England). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

The paper briefly outlines the status of the physics design and is divided into four broad categories: (1) the use of a beam transmission code in neutral injector system design; (2) the calculation of gas flows, pressure distributions and the resultant re-ionization loss; (3) energy reflection and sputtering; and (4) the Beam Bending Magnet.

32879 (CONF-8110118—, pp 627-639) **Advanced design of positive ion sources for neutral beam applications.** Marguerat, E.F.; Haselton, H.H.; Menon, M.M.; Schechter, D.E.; Stirling, W.L.; Tsai, C.C. (Oak Ridge National Lab., TN). 1981. NTIS, PC A99/MF A01.

From 3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL; Gatlinburg, TN, USA (19 Oct 1981).

Plasma ion temperatures in the 10-keV range are needed for fusion devices to have net energy production. A proven heating technique in current fusion plasma research is neutral beam injection. For future plasma heating applications in fusion reactors, high power neutral beam injectors could be based on an Advanced Positive Ion System (APIS) incorporating energy recovery to improve system efficiency. The heart of such injectors is the APIS ion source, which is being developed to meet a goal of producing ion beams of $\leq$ 200 keV, 100 A, with 10-30-s pulse lengths. In a continuing effort to advance the state of the art and to produce long pulse ion beams, APIS ion sources with grid dimensions of 10 x 25 cm, 13 x 43 cm, and 16 x 48 cm are being developed. In the past year, the 10- x 25-cm ion source has been operated to produce ion beams in excess of 100 keV for many seconds pulse length. An advanced design concept is being pursued with the primary objectives to improve radiation protection, reduce fabrication costs, and simplify maintenance. The source magnetic shield will be designed as a vacuum enclosure to house all source components. The electrical insulation requirements of energy recovery are also considered. Because of the frequent maintenance requirements, the electron emitter assembly will be designed with a remote handling capability. A new accelerator design which incorporates the necessary neutron shielding and associated steering gimbal system is also described.

32880 (CUED/C-Mech/TR—20) **Solution of two problem cases of non-axisymmetric loading of corrugated bellows by the MARC-CDC General Purpose Structural Analysis program: report to the UKAEA Culham Laboratory, Abingdon, Oxfordshire.** Snedden, N.W. (Cambridge Univ. (UK). Dept. of Engineering). Dec 1982. 42p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700904.

This report outlines the application of the MARC-CDC Structural Analysis Program to two corrugated bellows problems with non-axisymmetric loading. The problems are related to a fusion research experiment using a toroidal vacuum vessel fabricated from curved bellows segments. A FORTRAN program which generates mesh input data for a bellows with any number of corrugations is described. The program is sufficiently general to allow variation in the number and size of elements, in both principal directions, forming the bellows corrugation. A card deck of MARC input data is discussed for one of the two problems analysed. In addition to results of component stresses in the bellows, tables are provided summarizing the important nodal point data for the two problems. To confirm the validity of the solutions obtained, a comparison is made with results of approximate methods of analysis.

32881 (DOE/ER/52071—T5) RF plasma sources for neutral beam injection systems. Final technical progress report. Fosnight, V.V.; DiVergilio, W.F. (TRW Energy Development Group, Redondo Beach, CA (USA)). 15 Jan 1983. Contract AC03-81ER52071. 30p. NTIS, PC A03/MF A01. Order Number DE83006601.

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This document is the final technical report of a TRW contract from DOE to develop radio-frequency-powered hydrogen or deuterium plasma sources for use on neutral beamlines in support of fusion energy research. Two sources were developed. The first, designated the development model, was designed and built by TRW and tested in non-ion-beam-extraction experiments to demonstrate the suitability of an rf source for neutral-beam applications. The second was a Lawrence Berkeley Laboratory filament source that was modified for rf operation. In tests at TRW without beam extraction, its suitability for beam line tests was demonstrated, and this led to an LBL contract to perform such tests at LBL. Descriptions of both sources and the results of the tests without beam extraction are presented. Some preliminary results of the very successful beam line tests at LBL are also given.

32882 (DOE/ER/52076—4) EPFL (Swiss) fusion-fission hybrid experiment. Progress report No. 4, August 1, 1982-October 31, 1982. Woodruff, G.L. (Washington Univ., Seattle (USA). Dept. of Nuclear Engineering). 10 Jan 1983. Contract AT06-82ER52076. 20p. NTIS, PC A02/MF A01. Order Number DE83011461.

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The work performed during this report period included Monte Carlo calculations. The present phase of work involves replacing the complicated Haefely source model with simple equivalent surface source model in the computer simulation of the LOTUS experiments. The Haefely source in its original detail would use up a substantial portion of the allowed maximum number of cells and surfaces in the MCNP code. A detailed description of the space, energy and angular distribution of neutrons reaching the surface of the source was obtained using the MCNP code.

32883 (DOE/ER/53091—T6) Collisional mechanisms in D^- beam sources for MFE experiments and reactors. Progress report No. 13, quarter ending March 31, 1982. Coggiola, M.J.; Peterson, J.R. (SRI International, Menlo Park, CA (USA)). 19 Apr 1983. Contract AT03-80ER53091. 11p. NTIS, PC A02/MF A01. Order Number DE83010628.

A simple technique is described which allows a reservoir-type liquid nitrogen trap to be converted to continuous operation with a closed-cycle mechanical refrigeration system. The conversion requires no internal modification to the trap and uses only standard commercial refrigeration components. Using 502 refrigerant as the working fluid, temperatures of -52°C are readily achieved in a trap operating above a 6" water-cooled baffle and oil diffusion pump.

32884 (DOE/ER/54013—1) Critical issues for magnetic-fusion reactors. Final report, July 23, 1982-January 22, 1983. Kulcinski, G.L.; Wolfer, W.G.; Santarius, J.F. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering). Apr 1983. Contract AC02-82ER54013. 95p. NTIS, PC A05/MF A01. Order Number DE83010993.

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The objectives of the University of Wisconsin effort for this contract were to: (1) participate in the Technology Development Facility (TDF) study; (2) study the effect of melt layer and coating stability on pumped limiters; and (3) participate in the FED/INTOR Cost-Risk-Benefit Study. Some details of each study are given. (MOW)

32885 (DOE/ET/51013—53) HESTER: a hot-electron superconducting tokamak experimental reactor at M.I.T. Schultz, J.H.; Montgomery, D.B. (Massachusetts Inst. of Tech., Cambridge (USA). Plasma Fusion Center). Apr 1983. Contract AC02-78ET51013. 202p. NTIS, PC A10/MF A01. Order Number DE83011628.

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HESTER is an experimental tokamak, designed to resolve many of the central questions in the tokamak development program in the 1980's. It combines several unique features with new perspectives on the other major tokamak experiments scheduled for the next decade. The overall objectives of HESTER, in rough order of their presently perceived importance, are the achievement of reactor-like wall-loadings and plasma parameters for long pulse periods, determination of a good, reactor-relevant method of steady-state or very long pulse tokamak current drive, duplication of the planned very high temperature neutral injection experiments using only radio frequency heating, a demonstration of true steady-state tokamak operation, integration of a high-performance superconducting magnet system into a tokamak experiment, determination of the best methods of long term impurity control, and studies of transport and pressure limits in high field, high aspect ratio tokamak plasmas. These objectives are described.

32886 (GTFR—38) Technology-development needs for magnetic fusion. Stacey, W.M. Jr.; Baker, C.C.; Conn, R.W.; Krakowski, R.A.; Steiner, D.; Thomassen, K.I. (Georgia Inst. of Tech., Atlanta (USA)). Mar 1983. Contract AS05-78ET52025. 53p. NTIS, PC A04/MF A01. Order Number DE83010904.

The technology-development needs for magnetic fusion have been identified from an assessment of the conceptual design studies which have been performed. A summary of worldwide conceptual design effort is presented. The relative maturity of the various confinement concepts and the intensity and continuity of the design efforts are taken into account in identifying technology development needs. A major conclusion of this study is that there is a high degree of commonality among the technology requirements identified for the various confinement concepts.

32887 (GTFR—41) Ripple reduction coils for tokamak reactors. Bateman, G.; Fox, J.R. (Georgia Inst. of Tech., Atlanta (USA). School of Nuclear Engineering and Health Physics). 28 Mar 1983. Contract AS05-78ET52025. 7p. NTIS, PC A02/MF A01. Order Number DE83011091.

Ripple Reduction Poloidal Field (RRPF) coils together with blocks of ferro-magnetic iron shielding are used to design a commercial tokamak reactor similar in size to STARFIRE with only eight rather than twelve toroidal field (TF) coils. The RRPF coils function like segmented poloidal field coils, placed between the TF coils and the neutron shielding, carrying an average of +- 6 MA turns of current in the toroidal direction. Together with an additional pair of vertical field coils carrying 4.8 MAT, they produce the poloidal field needed for a $<\beta> \simeq 6\%$ plasma equilibrium with elongation 1.68 and a pair of separatrices suitable for a poloidal divertor. The RRPF coils also reduce magnetic ripple near the top and bottom of the plasma while the laminated blocks of iron magnetic shielding placed under each TF coil reduce magnetic ripple near the midplane from a maximum of 5.48% to less than 1%.

32888 (IPP—2/257) Sensitivity of the present INTOR layout to variations of some performance objectives. Borrass, K. (Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). May 1982. 16p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750052.

The sensitivity of the INTOR layout to variations of the main performance objectives and design specifications is studied with the SUPERCOIL layout model. The stored energy (Esub(m)) and the outer coil radius (R_a) are used as figures of merit. The objectives and specifications under consideration are the neutron wall load, the neutron fluence, the ignition margin and the blanket modularity respectively.

32889 (ITEF—25(1982)) Longitudinal compression of ion beams. Barkhudaryan, A.V.; Koshkarev, D.G. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1982. 14p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83700906.

Longitudinal compression of ion beams being necessary in some driver schemes intended for realizing heavy ion inertia fusion

is under consideration. With account of Coulomb forces in beams two compression schemes are investigated: with conservation of longitudinal phase volume of beams and with phase volume increase. The results obtained are valid under ideal linearity of the grouping field. The number of high-frequency voltage harmonics required for ensuring sufficient field linearity can be determined only by means of numerical simulation. Preliminary calculations have shown that ion losses under beam grouping because of nonlinearity of the high-frequency field depend on beam current and number of used harmonics. At beam current < 10 A three harmonics ensure 95% of beam assembly; at higher current for obtaing the same efficiency of beam assembly the increased number of harmonics is required. The parameters of the compression system are optimized, taking as an example heavy ion inertial fusion plant, with 10 J beam energy and 25 ns target irradiation time.

32890 (ITEF—126(1981)) **Study on laser plasma as an ion source for the controlled fusion with heavy ions.** Barabash, L.Z.; Bykovskij, Yu.A.; Golubev, A.A.; Kozyrev, Yu.P.; Krechet, K.I.; Lapitskij, Yu.Ya.; Sharkov, B.Yu. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1981. 35p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83700905.

The results of experimental investigations of Pb^{208} multiply-charged lead ions, obtained in the course of CO_2 laser radiation effect on a solid target are presented. The experimental installation, the basic units of which are CO_2 - laser with transverse discharge, ion source chamber, time- of-flight space, 9-channel electrostatic mirror type mass-analyser with a detection unit, is described. Physical characteristics of a freely spreading laser plasma, ion distribution over energies, velocities and Z charges from $Z=+1$ to $Z=+10$ are investigated. Absolute values of ion number of each charge property as well as absolute values of currents are obtained, the laser plasma temperature is estimated. The analysis of time distribution of ion quantity permits to point out the following regularities: with Z increase the ion current duration decreases according to the Δt approximately Z^{-1} law, with Z increase, the moment of the ion pulse beginning approaches to the moment of target irradiation which testifies that multiply-charged ions have high velocities and energies. The velocity distribution analysis permits to obtain ion velocity dependence in the field of maximum distribution on charge properties. The results presented are obtained at the temperature of hot unspreaded plasma about 60 eV. The data obtained are a basis for development of a real laser forinjector for the problems of the controlled fusion with heavy ions.

32891 (JAERI-M—9390, pp 49-67) **Conceptual design of tritium handling facility.** Tanaka, K.; Naruse, Y.; Tachikawa, K.; Matsuda, Y.; Obata, Y. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). Mar 1981. NTIS (US Sales Only). (CONF-8010314—).

From US/Japan workshop on fusion fuel handling; Tokyo, Japan (13 Oct 1980).

Design study was carried out in Japan Atomic Energy Research Institute (JAERI) to construct the facility handling gram amounts of tritium. In the Tritium Process Laboratory (TPL), basic engineering experiment is programmed to study the following subjects; the hydrogen isotope separation by cryogenic distillation and thermal diffusion, the purification, recovery and storage of tritium gas with metal getters and others, and the safe handling technology of tritium. The main characteristics of the design are to apply the multiple barrier containment system equipped with tritium removal system, to make zoning division clear and install proper ventilation system, and to select the materials and components suitable for tritium handling. Glovebox Purification System (GPS) and Air Detritiation System (ADS) are furnished to maintain the tritium concentration in the controlled areas less than the permissible level. Effluent Tritium Removal System (ERS) is equipped for the detritiation of various effluents from the experimental apparatus. Emergency Clean-up System (ECS) is disposed for the protection against the accidental release of tritium. Each tritium removal system can be used for multipurposes. Other supporting facilities of this Laboratory are a monitoring system, a tritiated liquid waste storage tank system, a closed circulation system for water cooling, and an emergency diesel generator.

32892 (JAERI-M—9390, pp 68-83) **Analysis of tritium containment system.** Naruse, Y.; Matsuda, Y. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). Mar 1981. NTIS (US Sales Only).

In Proceedings of the US/Japan workshop on fusion fuel handling. Exchange A-11 in the United States-Japan fusion cooperation program.

In the development of the tritium technology for fusion reactor research and development, the safe facility must be provided with the functions of protecting personnel from tritium activity exposure and preventing tritium release to the environment. In JAERI, a detailed design study of Tritium Process Laboratory (TPL) is now carried out, in which gram level of tritium will be handled. An analysis of the tritium containment system for the TPL is described. From the results, several conclusions were drawn. (1) To prevent the tritium leak from a glovebox to the working area, the water vapor concentration at the inlet of the dryer should be kept at a certain value. (2) In the gloveboxes at negative pressure, the glove material must have small permeability. (3) Water swamping is very effective for reducing the tritiated water vapor concentration in glovebox atmosphere.

32893 (KFK—3311/1) **TASKA - Tandem Spiegelmaschine Karlsruhe. Vol. 1.** (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Technische Physik). Jun 1982. 581p. (USWFDM—500). NTIS (US Sales Only), PC A25/MF A01. Order Number DE83750249.

TASKA-Team.

TASKA (Tandem Spiegelmaschine Karlsruhe) is a near term engineering test facility based on a tandem mirror concept with thermal barriers. The main objectives of this study were to develop a preconceptual design of a facility that could provide engineering design information for a Demonstration Fusion Power Reactor. Thus TASKA has to serve as testbed for technologies of plasma engineering, superconducting magnets, materials, plasma heating, breeding and test blankets, tritium technology, and remote handling.

32894 (KFK—3311/2) **TASKA - Tandem Spiegelmaschine Karlsruhe. Vol. 2.** (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Technische Physik). Jun 1982. 446p. (USWFDM—500-Vol.2). NTIS (US Sales Only), PC A19/MF A01. Order Number DE83750262.

TASKA-Team.

TASKA (Tandem Spiegelmaschine Karlsruhe) is a near term engineering test facility based on a tandem mirror concept with thermal barriers. The main objectives of this study were to develop a preconceptual design of a facility that could provide engineering design information for a Demonstration Fusion Power Reactor. Thus TASKA has to serve as testbed for technologies of plasma engineering, superconducting magnets, materials, plasma heating, breeding and test blankets, tritium technology, and remote handling.

32895 (KFTI—81-49, pp 66-71) **Cooling of the superconducting magnetic system of the "Crystal-2" torsatron.** Glasov, B.V.; Druj, O.S.; Kurnosov, V.I.; Skibenko, E.I.; Skrypin, S.I.; Yuferov, V.B. 1981. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In General and nuclear physics.

Experimental results on cooling of the superconducting magnetic system (SMS) of "Crystal 2" torsatron are presented. SMS cooling regimes are determined. Total specific energy expenditures, connected with operation of different units of the plant, are measured. Heat conductivity coefficients for transition layer and superconducting winding are estimated. Volume coefficient of steam content values for helium depending on temperature for different values of mass coefficient of steam content are tabulated. A correlation between current characteristics of superconducting winding and phase state of cryogenics at the input in its channel is established.

32896 (KFTI—81-49, pp 59-65) **Choice of cooling regime of the superconducting magnetic system of the "Crystal-2" torsatron.** Glasov, B.V.; Druj, O.S.; Kurnosov, V.I.; Skibenko, E.I.; Yuferov, V.B. 1981. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In General and nuclear physics.

General requirements to a system of cryogenic cooling of superconducting magnetic systems (SMS) are formulated. Distributions of the value of thermal stresses about the temperature range are obtained for basic construction materials of SMS "Crystal-2" torsatron. Concrete circuits of SMS cryoprovision are considered. Values of specific and total heat capacity of the system, specific consumption of liquid are determined taking into consideration constructional peculiarities of SMS of"Crystal-2" plant. Efficiency of different ways of SMS cooling are estimated, dynamical dependences of cooling and heating of SMS of the "Crystal-2" plant are obtained taking this into consideration.

32897 (LA-UR—83-943) **Software design for the Tritium System Test Assembly.** Claborn, G.W.; Heaphy, R.T.; Lewis, P.S.; Mann, L.W.; Nielson, C.W. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 7p. (CONF-830406—12). NTIS, PC A02/MF A01. Order Number DE83009902.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

The control system for the Tritium Systems Test Assembly (TSTA) must execute complicated algorithms for the control of several sophisticated subsystems. It must implement this control with requirements for easy modifiability, for high availability, and provide stringent protection for personnel and the environment. Software techniques used to deal with these requirements are described, including modularization based on the structure of the physical systems, a two-level hierarchy of concurrency, a dynamically modifiable man-machine interface, and a specification and documentation language based on a computerized form of structured flowcharts.

32898 (LA-UR—83-1011) **Explosive flux-compression strip generators.** Fowler, C.M.; Peterson, D.R.; Kerrisk, J.F.; Caird, R.S.; Erickson, D.J.; Freeman, B.L.; Goforth, J.H. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 28p. (CONF-830606—4). NTIS, PC A03/MF A01. Order Number DE83011317.

From 3. international conference on magagauss magnetic field generation and related topics; Novosibirsk, USSR (13 Jun 1983).

A class of explosive-driven flux-compression generators, called strip generators, has been developed for railgun power sources. We describe the construction of these generators and note simple geometric variations that can be made to alter their output pulses. Current wave forms are presented together with various current integrals that help determine their most useful ranges of applicability in powering railguns. A useful generator calculational model is also described. The model includes the effect of generator component displacements from magnetic forces, has provisions to allow for flux losses at the moving contact point, and also calculates the high frequency inductance of the generator.

32899 (LA-UR—83-1083) **Plasma focus experiments powered by explosive generators.** Freeman, B.L.; Caird, R.S.; Erickson, D.J.; Fowler, C.M.; Garn, W.B.; Kruse, H.W.; King, J.C.; Bartram, D.E.; Kruse, P.J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 28p. (CONF-830606—5). NTIS, PC A03/MF A01. Order Number DE83011166.

From 3. international conference on magagauss magnetic field generation and related topics; Novosibirsk, USSR (13 Jun 1983).

The plasma focus project began as an effort to develop an intense, pulsed, expendable neutron radiographic source. Since previous efforts to power a plasma focus with explosive generators had been successful, we proposed to couple our plate generators to a coaxial-geometry plasma focus to achieve this goal. Utilizing a small capacitor bank and a selected set of diagnostics, the explosive experiments were successfully conducted with maximum currents of 1.5 MA to 2.4 MA. A maximum neutron yield of $\sim 3 \times 10^{11}$ (DD) neutrons was achieved at the 2.4 MA level. Since the neutron yield did scale as a power of the maximum delivered current, and the neutron-producing source region was small, we conclude that this approach is an attractive option to achieve a neutron radiographic source. The need for a reliable open-circuiting switch at several megamperes has resulted in postponement of the project.

32900 (LA-UR—83-1139) **Brief history of the Los Alamos laser programs.** Boyer, K. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 5p. (CONF-830425—15). NTIS, PC A02/MF A01. Order Number DE83011135.

From Society of Photo-Optical Instrumentation Engineers conference; Santa Fe, NM, USA (11 Apr 1983).

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The laser programs at Los Alamos began in 1969 to investigate the feasibility of laser-induced fusion. However, within a year they had been expanded to include a number of other applications including laser isotope separation. These programs now compose a substantial part of the Laboratory's research programs.

32901 (NRL-MR—5029) **Use of induced spatial incoherence for uniform illumination on laser-fusion targets.** Lehmberg, R.H.; Obenschain, S.P. (Naval Research Lab., Washington, DC (USA)). 11 Apr 1983. Contract AI01-77DP40042. 15p. NTIS, PC A02/MF A01. Order Number DE83011075.

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We report a technique to achieve very uniform illumination of laser irradiated targets by inducing a controlled amount of transverse spatial incoherence in the output beam of a broadband laser. The spatial incoherence is created by imposing different optical delays upon different transverse sections of the beam, and choosing the delay increments to be larger than the laser coherence time t/ sub c/ = 1/Δ nu. This technique may allow easy attainment of the pellet illumination uniformity required for laser fusion.

32902 (PPPL—1988) **Mechanical engineering aspects of TFTR.** Citrolo, J.C. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Apr 1983. Contract AC02-76CH03073. 24p. (CONF-821101—22). NTIS, PC A02/MF A01. Order Number DE83010841.

From ASME winter annual meeting (Engineering applications of laser velocimetry/published in ASME Jr. Fluid Engineering); Phoenix, AZ, USA (14 Nov 1982).

This paper briefly presents the principles which characterize a tokamak and discusses the mechanical aspects of TFTR, particularly the toroidal field coils and the vacuum chamber, in the context of being key components common to all tokamaks. The mechanical loads on these items as well as other design requirements are considered and the solutions to these requirements as executed in TFTR are presented. Future technological developments beyond the scope of TFTR, which are necessary to bring the tokamak concept to a full fusion-power system, are also presented. Additional methods of plasma heating, current drive, and first wall designs are examples of items in this category.

32903 (UCRL—88224) **Fusion-power demonstration.** Henning, C.D.; Logan, B.G.; Carlson, G.A.; Neef, W.S.; Moir, R.W.; Campbell, R.B.; Botwin, R.; Clarkson, I.R.; Carpenter, T.J. (Lawrence Livermore National Lab., CA (USA)). 29 Mar 1983. Contract W-7405-ENG-48. 9p. (CONF-830406—23). NTIS, PC A02/MF A01. Order Number DE83010370.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

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As a satellite to the MARS (Mirror Advanced Reactor Study) a smaller, near-term device has been scoped, called the FPD (Fusion Power Demonstration). Envisioned as the next logical step toward a power reactor, it would advance the mirror fusion program beyond MFTF-B and provide an intermediate step toward commercial fusion power. Breakeven net electric power capability would be the goal such that no net utility power would be required to sustain the operation. A phased implementation is envisioned,

with a deuterium checkout first to verify the plasma systems before significant neutron activation has occurred. Major tritium-related facilities would be installed with the second phase to produce sufficient fusion power to supply the recirculating power to maintain the neutral beams, ECRH, magnets and other auxiliary equipment.

32904 **(UCRL—88237) Nucleonics of a Be-Li-Th blanket for the fusion breeder.** Lee, J.D. (Lawrence Livermore National Lab., CA (USA)). 28 Mar 1983. Contract W-7405-ENG-48. 8p. (CONF-830406—24). NTIS, PC A02/MF A01. Order Number DE83010363.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

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The nuclear performance of a candidate fission-suppressed, U233-producing blanket is assessed. It is predicted to have a breeding ratio (fusile + fissile) of 1.68 and produce U233 at a rate of 8030 kg/year from 3140 MW of DT fusion and a blanket coverage of 96%. Blanket energy multiplication is estimated to vary between 1.3 and 2.0 as the U233/Th232 ratio varies between 0 and 0.5%. Heterogeneous effects in the blanket's pebble-bed configuration were found to be important and more detailed analysis is needed to more accurately predict Li6 content required and U233 fission power versus U233 content.

32905 **(UCRL—88238) Plasma engineering for MARS.** Carlson, G.A.; Baldwin, D.E.; Barr, W.L. (Lawrence Livermore National Lab., CA (USA)). 24 Mar 1983. Contract W-7405-ENG-48. 7p. (CONF-830406—25). NTIS, PC A02/MF A01. Order Number DE83010367.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

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The two-year Mirror Advanced Reactor Study (MARS) has resulted in the conceptual design of a commercial, electricity-producing fusion reactor based on tandem mirror confinement. The physics basis for the MARS reactor was developed through work in two highly coupled areas of plasma engineering: magnetics and plasma performance.

32906 **(UCRL—88281) High-explosive-driven delay line pulse generator.** Shearer, J.W. (Lawrence Livermore National Lab., CA (USA)). 15 Nov 1982. Contract W-7405-ENG-48. 27p. (CONF-830606—1). NTIS, PC A03/MF A01. Order Number DE83003877.

From 3. international conference on magagauss magnetic field generation and related topics; Novosibirsk, USSR (13 Jun 1983).

The inclusion of a delay line circuit into the design of a high-explosive-driven generator shortens the time constant of the output pulse. After a brief review of generator concepts and previously described pulse-shortening methods, a geometry is presented which incorporates delay line circuit techcniques into a coil generator. The circuit constants are adjusted to match the velocity of the generated electromagnetic wave to the detonation velocity of the high explosive. The proposed generator can be modeled by adding a variable inductance term to the telegrapher's equation. A particular solution of this equation is useful for exploring the operational parameters of the generator. The duration of the electromagnetic pulse equals the radial expansion time of the high-explosive-driven armature until it strikes the coil. Because the impedance of the generator is a constant, the current multiplication factor is limited only by nonlinear effects such as voltage breakdown, diffusion, and compression at high energies.

32907 **(UCRL—88909) Time-dependent behavior of magnetic fields confined by conducting walls.** Kidder, R.E.; Cecil, A.B. (Lawrence Livermore National Lab., CA (USA)). 9 Mar 1983. Contract W-7405-ENG-48. 17p. (CONF-830606—3). NTIS, PC A02/MF A01. Order Number DE83009118.

From 3. international conference on magagauss magnetic field generation and related topics; Novosibirsk, USSR (13 Jun 1983).

An equation is derived which describes the total current flowing in a moving conducting surface surrounding a magnetic field, where diffusion of the field into the conductor is taken into account. Analytic and numerical solutions of the current equation are obtained for the cases of exponential and linear compression of the magnetic field with time, respectively. It is assumed that the electrical conductivity is constant, that the conducting surfaces are axially symmetric, and that the thickness and radius of curvature of the conducting walls is large compared with the effective depth of penetration of the field.

32908 **(UCRL—88930) Properties of coaxial magnetocumulative generators.** Kidder, R.E. (Lawrence Livermore National Lab., CA (USA)). 14 Mar 1983. Contract W-7405-ENG-48. 17p. (CONF-830606—2). NTIS, PC A02/MF A01. Order Number DE83009123.

From 3. international conference on magagauss magnetic field generation and related topics; Novosibirsk, USSR (13 Jun 1983).

The properties of a coaxial magnetocumulative generator (MCG) in which the current increases exponetially with time are derived and discussed. Such an exponential MCG possess highly desirable performance characteristics that are readily derived and expressed in terms of simple formulas. It is concluded that an exponential MCG may approach a capability of delivering 100 megajoules to a 1 nanohenry load in 1 microsecond.

32909 **(UCRL—89018) Symposium: new trends in unconventional approaches to magnetic fusion.** Post, R.F. (Lawrence Livermore National Lab., CA (USA)). 5 Apr 1983. Contract W-7405-ENG-48. 24p. (CONF-830623—1). NTIS, PC A02/MF A01. Order Number DE83010064.

From New trends in unconventional approaches to magnetic fusion conference; Stockholm, Sweden (16 Jun 1982).

An extensive review of the meeting is given. The concepts discussed included reverse-field pinches, compact tori, advanced stellarators, multipoles, surface magnetic confinement systems, the bumpy torus, and a collection of mirror-based approaches. (MOW)

32910 **Moment free toroidal magnet.** Bonanos, P. (to Dept. of Energy). US Patent 4,378,545. 29 Mar 1983. Filed date 2 Mar 1981. vp.

PAT-APPL-239866.

A toroidal magnet for confining a high magnetic field for use in fusion reactor research and nuclear particle detection. The magnet includes a series of conductor elements arranged about and fixed at its small major radius portion to the outer surface of a central cylindrical support each conductor element having a geometry such as to maintain the conductor elements in pure tension when a high current flows therein, and a support assembly which redistributes all or part of the tension which would otherwise arise in the small major radius portion of each coil element to the large major radius portion thereof.

32911 **Foam encapsulated targets.** Dahlbacka, G.H.; Nuckolls, J.H.; Thiessen, A.R. (to Dept. of Energy). US Patent 4,376,752. 15 Mar 1983. Filed date 2 Sep 1975. vp.

PAT-APPL-609639.

Foam encapsulated laser-fusion targets wherein a quantity of thermonuclear fuel is embedded in low density, microcellular foam which serves as an electron conduction channel for symmetrical implosion of the fuel by illumination of the target by one or more laser beams. The fuel, such as DT, is contained within a hollow shell constructed of glass, for example, with the foam having a cell size of preferably no greater than 2 mu m, a density of 0.065 to 0.6 X 103 kg/m3, and external diameter of less than 200 mu m.

32912 **Pellet injection into PDX diverted plasmas.** Milora, S.L.; Houlberg, W.A.; Attenberger, S.E.; Foster, C.A. (Oak Ridge National Lab., TN (USA)); Schmidt, G.L.; Arunasalam, V.; Fonck, R.; Grek, B.; Johnson, D.; McGuire, K. *Nuclear Fusion;* **22**: No. 10, 1236-1271(Oct 1982).

Initial hydrogen pellet injection experiments have been performed in plasmas characterized by a low particle re-cycle fraction resulting from the action of a poloidal magnetic divertor. As in past experiments, the interaction of the fuel with the plasma is observed to be adiabatic. Moreover, the pellet mass is accounted for in the

core plasma density increase, indicating only a small loss of fuel while the pellet transits the divertor scrape-off plasma. The effect of edge re-cycling on the density was studied by comparing divertor (low-re-cycle) and limiter (high-re-cycle) plasmas; the distinction between the two cases is clearest in the edge plasma region where the density decay rates differ most. Particle transport subsequent to pellet injection is less ambiguous for divertor cases, and, by comparing the density profile relaxation and the electron temperature recovery with an empirical transport model that closely approximates the pre-injection plasma conditions, it is concluded that the plasma confinement properties do not deteriorate as a result of pellet injection. The principal difference between central and edge fuelling is demonstrated by a peaking of the density profile and an extended decay time for the density perturbation.

32913 **(ORNL-tr—4977) Toroidal magnet for a tokamak with a strong magnetic field and combined adiabatic compression of the pinch.** Alekseev, Yu. A.; Demichev, V.F.; Safonova, M.G.; Chuyanov, V.A. (Oak Ridge National Lab., TN (USA); Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1981. Contract W-7405-ENG-26. C; IAE-3513/7, Moscow 1981. 46p. NTIS, PC A03/MF A01. Order Number DE83011545.

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This report examines the concept and the main characteristics of the torroidal magnet in a tokamak with a strong magnetic field and combined adiabatic compression of the plasma pinch for an experiment to achieve the parameter Q = 1.

99 GENERAL AND MISCELLANEOUS

9901 Management

32914 **(CONF-8209126—) Communications Managers Workshop. Summary of proceedings.** (USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Computer Services and Telecommunications Management). 1982. 271p. NTIS, PC A12/MF A01. Order Number DE83010280.

From DOE communications managers workshop; Springfield, VA, USA (27 Sep 1982).

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The Communications Managers Workshop was held September 27-28, 1982. Presentations in Session I focused on the policy, legislative, and judicial changes at the American Telephone and Telegraph Company, the Chesapeake and Potomac Telephone Company, and the GTE Service Corporation. The National Emergency Preparedness Program was also discussed. Session II centered on telecommunications long range planning. Session III consisted of five OPMODEL presentations. The information covered the OPMODEL procurement process, implementation plan, and funding. OPMODEL working group reports on protocol, security, and administration concluded the session. A speech concerning SACNET II was delivered in Session IV. Session V addressed new data communications services, such as NET 1, at American Bell. Summaries of the sessions are provided in the form of vu-graphs presented at the workshop.

32915 **(DOE/OR/00033—T22) Oak Ridge Associated Universities thirty-sixth annual report, fiscal year 1982.** (Oak Ridge Associated Universities, Inc., TN (USA)). 1982. Contract AC05-76OR00033. 32p. NTIS, PC A03/MF A01. Order Number DE83011553.

Programs in the following divisions are discussed briefly: Comparative Animal Research Laboratory; Energy Education; Institute for Energy Analysis; Manpower Education, Research, and Training; Medical and Health Sciences; and University Isotope Separator at Oak Ridge.

32916 **(SAND—83-0526C) Financial graphics system.** Buck, C.D.; Coy, M.E. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 10p. (CONF-830620—1). NTIS, PC A02/MF A01. Order Number DE83008909.

From National Computer Graphics Association annual conference; Chicago, IL, USA (26 Jun 1983).

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This paper describes the Financial Graphics System developed at Sandia National Laboratories (Sandia), the operation of the system, and the future plans for financial graphics at Sandia. Design objectives for the system were to: provide a means for producing graphs on demand by the Comptroller's staff, which would decrease lapsed time required and reduce direct programming effort, improve Sandia's capabilities for using graphics as a tool for management reporting through evaluation and testing of graphic equipment and software, provide a graphic support system which would be compatible with other company financial reporting tools, and integrate financial statistical analysis with the graphics system.

9902 Mathematics And Computers

REFER ALSO TO CITATION(S) 31264, 31284, 31285, 31286, 31287, 31288, 31306, 32630, 32639, 32780

32917 **(CONF-830447—2) Notes on teaching computing.** Gabriel, J.R. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83010714.

From Workshop on small computers; Atlanta, GA, USA (3 Apr 1983).

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There are two kinds of qualification to use computers, those used incidentally to anothr marketable skill, and those needed to solve more-difficult problems. Although the second kind can be taught using pesonal computers, and can be taught to children in high school or even grade school, they are not usually taught even in two-year colleges. This is the first of two talks discussing what these skills are, what is needed to teach them, and how a program might be developed at minimal cost by integrating it with an industrial arts course in a two-year college.

32918 **(CONF-830615—3) Hourglass control in linear and nonlinear problems.** Belytschko, T.; Liu, W.K.; Kennedy, J.M. (Northwestern Univ., Evanston, IL (USA). Dept. of Civil Engineering; Northwestern Univ., Evanston, IL (USA). Dept. of Mechanical and Nuclear Engineering; Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 28p. NTIS, PC A03/MF A01. Order Number DE83010711.

From ASME summer meeting; Houston, TX, USA (20 Jun 1983).

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Mesh stabilization techniques for controlling the hourglass modes in underintegrated hexahedral and quadrilateral elements are described. It is shown that the orthogonal hourglass techniques previously developed can be obtained from simple requirements that insure the consistency of the finite element equations in the sense that the gradients of linear fields are evaluated correctly. It is also shown that this leads to an hourglass control that satisfies the patch test. The nature of the parameters which relate the generalized stresses and strains for controlling hourglass modes is examined by means of a mixed variational principle and some guidelines for their selection are discussed. Finally, effective means of implementing these hourglass procedure in computer codes are described. Applications to both the Laplace equation and the equations of solid mechanics in 2 and 3 dimensions are considered.

32919 **(CONF-8104191—1) Improvement of some NAG Library routines.** Wang, J.Y. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007757.

From NAG users association inaugural meeting; Oxford, UK (8 Apr 1981).

Some of the NAG Library routines were studied in detail by the Applied Mathematics Division of Argonne National Laboratory so that appropriate software could be recommended for both inexperienced and sophisticated users. The types of problems that the study uncovered will be discussed. Recommendations for improving the accuracy and efficiency of several routines will be present-

ed. Some numerical results and timing information will also be provided.

32920 **(CONF-8206178—3) Logic Machine Architecture: inference mechanisms.** Lusk, E.L.; McCune, W.W.; Overbeek, R.A. (Argonne National Lab., IL (USA); Northwestern Univ., Evanston, IL (USA); Northern Illinois Univ., Dekalb (USA)). 1982. Contract W-31-109-ENG-38. 23p. NTIS, PC A02/MF A01. Order Number DE83010721.

From 6. CADE conference on automated deduction; New York, NY, USA (1 Jun 1982).

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Logic Machine Architecture (LMA) is a layered implementation of theorem-proving tools. The kernel of formula storage, retrieval, and manipulation primitives (layers 0 and 1) is described elsewhere. The layer described here (layer 2) contains resolution- and equality-based inference rules, subsumption, and demodulation. It is designed to provide all of the tools required to create a theorem-prover with minimal effort. Although LMA is currently implemented in Pascal, an interface to LISP will be included in the original release. This paper includes the design principles and techniques used in layer 2, as well as two simple theorem provers which illustrate the services of layer 2 - one written in LISP and the other in Pascal.

32921 **(CONF-8206178—4) Logic Machine Architecture: kernel functions.** Lusk, E.L.; McCune, W.W.; Overbeek, R.A. (Argonne National Lab., IL (USA); Northwestern Univ., Evanston, IL (USA); Northern Illinois Univ., Dekalb (USA)). 1982. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83010629.

From 6. CADE conference on automated deduction; New York, NY, USA (1 Jun 1982).

In this paper we present an attempt to abstract from the great diversity of approaches to automated deduction a core collection of operations which are common to all of them. Implementation of this kernel of functions provides a software platform upon which a variety of theorem-proving systems can be built. We outline the architecture for a layered family of software tools to support the development of theorem-proving systems and present in some detail the functions which comprise the two lowest layers. These are the layer implementing primitive abstract data types not supported by the host language and the layer providing primitives for the manipulation of logical formulas. This layer includes the implementation of efficient unification and substitution application algorithms, structure sharing within the formula database, and efficient access to formulas via arbitrary user-defined properties. The tools are provided in a highly portable form (implemented in Pascal) in order that a diverse community of users may build on them.

32922 **(ENEA-RT/EDP—82-3) COMGRAPH system for control of the output of a videographic terminal.** Maioli, C.; Mareso, T.; Litido, M. (Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Direzione Centrale Sistemi Informativi). Jun 1982. 11p. (In Italian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901916.

In this report a description is given of the software system COMGRAPH developed by INFO-GER Bologna; the purpose of these programs is to control the outputs produced by two terminals, one being a Tektronix video-graphic unit, simultaneously running under TSO MVS.

32923 **(ENEA-RT/EDP—82-4) FS2 system for control of IBM 3270 video-type terminal under MVS/TSO.** Fantin, S. (Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Direzione Centrale Sistemi Informativi). Jul 1982. 43p. (In Italian). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901783.

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Some routines have been written to manage full-screen operation for IBM 3270 screens. The programmer calls these routines through CALL statements in his FORTRAN, COBOL or PL/1 program. It is possible to create menus ad hoc without any change in the program. No knowledge of machine language or operating system is required.

32924 **(ENEA-RT/EDP—82-5) BC graphics system: reference manual.** Panini, G.C. (Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Dipartimento Tecnologie Intersettoriali di Base). May 1982. 88p. (In Italian). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83901784.

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The BC System is a package of inter-related subroutines entirely written in FORTRAN IV to graphically display computer data. In order to produce graphics output a FORTRAN programme is written to perform whatever computations and/or graphics manipulations are needed to produce the desired image. Its features include portability, device independent, modularity and easy to use. All entry points of the System are described in this report which gives a reference for an improvement of the results obtained through a reading of the primer GUIDA PER L'UTENTE(CNEN-RT/EDP(80)6).

32925 **(HEDL-TC—2314) Standards and guidelines applicable to scientific software life cycle.** Wilburn, N.P. (Hanford Engineering Development Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76FF02170. 108p. NTIS, PC A06/MF A01. Order Number DE83010267.

A survey of 128 standards and guidelines is given as to their applicability in the development of scientific software. The coverage by the standard or guidelines of the four aspects (performance, documentation, verification, management) of each of the six phases of the software life cycle (requirements, design, implementation, testing, operation, maintenance) is identified.

32926 **(SAND—83-0042) Status report on knapsack-based public key cryptosystems.** Brickell, E.F.; Simmons, G.J. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 78p. NTIS, PC A05/MF A01. Order Number DE83010697.

In the period since 1976, when Diffie and Hellman published the first discussion of two-key cryptography to appear in the open literature, only a handful of two-key cryptoalgorithms have been proposed - two of which are based on the knapsack problem. Consequently there was enormous interest when Shamir announced in early 1982 a cryptanalytic technique that could break many Merkle-Hellman knapsacks. In a rapid sequence of developments, Simmons and Brickell, Adleman, and Lagarias all announced other attacks on knapsack-based cryptosystems that were either computationally much more efficient or else directed at other knapsack schemes such as the Graham-Shamir or iterated systems. This paper analyzes the common features of knapsack-based cryptosystems and presents all of the cryptanalytic attacks made in 1982 from a unified viewpoint.

32927 **(SAND—83-0440) GRAPTRAN programmer/user guide.** Renninger, D.J. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 20p. NTIS, PC A02/MF A01. Order Number DE83010720.

This document describes a computer program called GRAPTRAN which is used to translate geometric entities from an Applicon AGS/880 file to a GRAPL file format which can be used as input to an AN-4000 and CD-2000 systems.

32928 **(UCID—19777) Communicating from the PET to the Wang.** Barton, G.W. Jr.; Downey, R.M.; Johnson, D.C.; Johnson, Q. (Lawrence Livermore National Lab., CA (USA)). 12 Apr 1983. Contract W-7405-ENG-48. 19p. NTIS, PC A02/MF A01. Order Number DE83012036.

Instructions are given for sending files from the PET 4032 microcomputer to the Wang wordprocessor, and back. The hardware used to convert standard IEEE-488 to RS-232 was the TNW-232D unit. WordPro 3, PaperClip, and XPTERM232 were the software used. The Wang station was configured for telecommunications.

32929 (UCID—19786) Good, the bad, and the ugly: analysis of a software project. Perkins, A.L. (Lawrence Livermore National Lab., CA (USA)). 21 Apr 1983. Contract W-7405-ENG-48. 19p. NTIS, PC A02/MF A01. Order Number DE83012056.

Portions are illegible in microfiche products.

I present the achievements made on Thermal Complex Information System (The Good), the mistakes (The Bad), and the disasters (The Ugly). I make proposals to help other projects repeat our achievements and avoid our mistakes and disasters. I begin by presenting historical information about the TCIS project. This will include: the project personnel (for completeness); the reasons for replacing the CDC 1700; the user's goals for their new computer facility, the Original Design Teams goals; and a chronological development of the project. I then take a more indepth look at the different design approaches used, and I will look at the coding and testing phases. I will then discuss the achievements and problems on TCIS, and present my suggestions for future projects.

32930 (UCID—30190) TORANAGA. Axelrod, T.S.; Dubois, P.F.; Hickman, R.B.; Hindmarsh, A.c.; Painter, J.F. (Lawrence Livermore National Lab., CA (USA)). 27 Jan 1983. Contract W-7405-ENG-48. 60p. NTIS, PC A04/MF A01. Order Number DE83012114.

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TORANAGA solves the initial value problem for systems of ordinary differential equations, dy/dt = f(t,y) where y and f are vectors. This manual describes the features of the program and how to use it.

32931 (UCRL—15528) Adaptation of mathematical methods to electromagnetic modeling. Final report, Task I. Deschamps, G.A.; Smeeth, R.H.; Wong, K.H. (Illinois Univ., Urbana (USA). Electromagnetics Lab.). Dec 1982. Contract W-7405-ENG-48. 66p. NTIS, PC A04/MF A01. Order Number DE83012105.

The two main contributions of this report are approaches to the network modeling of electromagnetic field problems, and to the handling of some particular distributions. The first item is promising because part of the discretize equations involved are rigorously exact and easily written down (discrete covariance). Problems that should be more thoroughly analyzed are the handling of boundary conditions and the prolongation problem. These have some obvious solutions, but they should be refined in particular when using sampling on a simplical complex. A comparison with other methods is also in order.

32932 (UCRL—88173) Piecewise data flow architecture control flow and register management. Requa, J.E. (Lawrence Livermore National Lab., CA (USA)). 7 Sep 1982. Contract W-7405-ENG-48. 22p. (CONF-830601—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83000359.

From 10. international symposium on computer architecture; Stockholm, Sweden (13 Jun 1983).

This paper presents the hardware register management and instruction block control flow sequencing provided by the PDF block processing section of the Piecewise Data Flow machine, a proposed high performance computer architecture. Combined, these capabilities provide the maximum allowed execution overlap of instruction blocks with minimum hardware contention and high hardware utilization.

32933 (UIUCDCS-R—82-1109) Stiff software: what do we have and what do we need. Gear, C.W. (Illinois Univ., Urbana (USA). Dept. of Computer Science). Nov 1982. Contract AC02-76ER02383. 38p. (UILU-ENG—82-1736; COO—2383-0088). NTIS, PC A03/MF A01. Order Number DE83011056.

Software for stiff differential equations is surveyed. The classical stiff problem is well-served by existing software and some codes are appearing for some of the other areas, particularly problems with eigenvalues near the imaginary axis. A number of other difficulties are identified and the state of and possibilities for software development in these areas are discussed.

32934 Solution of large-scale sparse least squares problems using auxiliary storage. George, J.A. (Univ., of Waterloo, Ontario); Heath, M.T.; Plemmons, R.J. *SIAM Journal on Scientific and Statistical Computing;* 2: No. 4, 416-429(Dec 1981). Contract W-7405-ENG-26.

LVery large sparse linear least squares problems arise in a variety of applications, such as geodetic network adjustments, photogrammetry, earthquake studies, and certain types of finite element analysis. Many of these problems are so large that it is impossible to solve them without using auxiliary storage devices. Some problems are so massive that the storage needed for their solution exceeds the virtual address space of the largest machines. In this paper we describe a method for solving such problems on a typical (large) computer and provide the results of some experiments illustrating the effectiveness of our approach. The method includes an automatic partitioning scheme which is essential to the efficient management of the data on auxiliary files.

32935 Solution of homogeneous systems of linear equations arising from compartmental models. Funderlic, R.E.; Mankin, J.B. (Union Carbide Corp., Oak Ridge, TN). *SIAM Journal on Scientific and Statistical Computing;* 2: No. 4, 375-383(Dec 1981). Contract W-7405-ENG-26.

Systems of linear differential equations with constant coefficients, Ax = x, with the matrix A having nonnegative off-diagnonal elements and zero column sums, occur in compartmental analysis. The steady-state solution leads to the homogeneous system of linear equations Ax(infinity)=x(infinity)=0. LU-factorization, the Crout algorithm, error analysis and solution of a modified system are treated.

32936 Prediction of work piece geometry in electrochemical cavity sinking. Riggs, J.B.; Muller, R.H.; Tobias, C.W. (Lawrence Berkeley Lab., CA). *Electrochimica Acta;* 26: No. 8, 961-969(1981). Contract W-7405-ENG-48.

A computer-implemented model for predicting ECM work piece geometry has been developed and experimentally verified with a commercial ECM machine for cavity sinking in copper and 302-stainless steel with 2N KNO_3 electrolyte. Constant tool piece feed rates of 7-10 x 10^{-4} cm/s, and applied voltages of 11-25 V were used. The model predicts the dependence of work piece geometry on operating conditions and on the electrochemical and physical properties of the metal-electrolyte pair. Comparison of eight equilibrium and six unsteady state experimental cavity profiles in copper showed satisfactory agreement with predictions, as did five equilibrium profiles for cavity sinking in 302-stainless steel.

32937 Rates of convergence for estimation and testing in multinomial distributions. Sutrick, K.H. Berkeley, CA; Univ. of California (1979). 181p. University Microfilms Order No. 80-14,900.

Thesis (Ph. D.).

This paper is concerned with various problems involving the multinomial distribution. Chapter 1 contains an asymptotic power comparison between the likelihood ratio test and a class of chi-square tests. The power comparison is based on the fact that suitably scaled the test statistics can be approximated by a normal. The comparison is similar to Hoeffding but his power comparison is made using the theory of large deviations. Chapters 2-4 deal with estimation of a single parameter. Expansion for the estimators and their mean square error are given. Many papers in this area have appeared including Rao, Effron, Ghosh and Subramanyam, and Robertson. Other authors justify the calculations for one fixed value of the parameter, in this paper it is shown how the calculations can be justified over the whole parameter space. It is also shown that there are other estimation procedures which have the same properties as minimum chi-square and maximum likelihood estimates. Chapter 4 contains examples of the expansions. When the examples are applied to the logistic model the results agree quite well with a computer study done by Berkson. Chapter 5 discussed estimation in the log-linear model. Under a full model a prior is defined for which the Bayes estimates can easily be calculated. Estimates for the submodel are obtained by projections. The results show that the contrasts in the log-odds of Lindley are Bayes with respect to a suitable prior.

9903 Information Handling

REFER ALSO TO CITATION(S) 31108, 31367, 31860

32938 (CONF-8109203—, pp vp) **Energy information and documentation as conditions for sensible decisions on the energy sector.** Reichensperger, P. 1981. (In German). NTIS (US Sales Only), PC A16/MF A01.

From ENERGOPLAN congress: energy as a chance for success; Wiesbeden, F.R. Germany (24 Sep 1981).

It is the task of information and documentation to facilitate the search for the present state of knowledge for any person looking for information in science, research industrial development and administration. After having given a survey of the information centres which are open to the general public the author demonstrates the number and kind of information services available as exemplified by the Fachinformationszentrum Energie, Physik, Mathematik.

32939 (SAND—83-0485C) **Use of DIALOG SDI capability to produce microfiche announcement bulletin.** Rowe, G. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 10p. (CONF-830612—1). NTIS, PC A02/MF A01. Order Number DE83007371.

From DIALOG update meeting; Los Angeles, CA, USA (23 Jun 1983).

The Selective Dissemination of Information feature on DIALOG, whereby a search is run automatically on a regular basis, is used on the National Technical Information Service file to identify all reports issued in microfiche by NASA and DOE and selected reports from DOD and NTIS. The output is grouped by COSATI category and output from DIALOG is arranged, labeled, and 365 copies are made. (MCG)

9905 Civilian Defense

REFER ALSO TO CITATION(S) 32210, 32395

32940 (UCRL—88938) **Numerical models and their role in emergency response: a perspective on dispersion modeling for emergency preparedness.** Greenly, G.D.; Dickerson, M.H. (Lawrence Livermore National Lab., CA (USA)). Mar 1983. Contract W-7405-ENG-48. 13p. (CONF-830617—2). NTIS, PC A02/MF A01. Order Number DE83009246.

From 76. annual meeting of the Air Pollution Control Association; Atlanta, GA, USA (19 Jun 1983).

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Numerical models on several levels of complexity should be available to the emergency response planner. They are a basic tool but must be used in conjunction with both measurements and experience. When these tools are used in a complimentary fashion they greatly enhance the capability of the consequence manager to respond in an emergency situation. Because each accident or incident develops it's own characteristics and requirements the system must be capable of a flexible response. Interaction and feedback between model results from a suite of models and measurements (including airborne measurements) serve the emergency response planner's spectrum of needs, ranging from planning exercises and emergency precalculations to a real-time emergency response.

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DOE Energy Information Data Base: Corporate Author Entries (DOE/TIC-4585) is used in the standardization of corporate entries. DOE/TIC-4585 is available for purchase from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, Virginia 22161.

A

Advanced Mechanical Technology, Inc., Newton, MA (USA)
Evaluation of improved materials for stationary diesel engines operating on residual and coal-based fuels. Final report, 8:31998 (R;US)

Aerodyne Research, Inc., Bedford, MA (USA). Center for Chemical and Environmental Physics
Measurement of fluorine atom concentrations and reaction rates in chemical laser systems. Final report 23 Jul 80-30 Jun 82, 8:32234 (R;US)

Aerodyne Research, Inc., Billerica, MA (USA). Center for Chemical and Environmental Physics
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. Third quarterly technical progress report, December 1, 1982-February 28, 1983, 8:31145 (R;US)

Aerospace Corp., El Segundo, CA (USA). Aerophysics Lab.
Catalytic reduction of nitrogen dioxide. Technical report, 8:32270 (R;US)

Aerospace Corp., El Segundo, CA (USA). Space Sciences Lab.
X-ray lines of helium-like oxygen and neon in the solar corona, 8:32648 (R;US)

Aerospace Corp., Los Angeles, CA (USA). Energy and Resources Div.
Nuclear-power-safety reporting system: feasibility analysis, 8:31774 (R;US)

AiResearch Mfg. Co., Torrance, CA (USA)
Lightweight electronically commutated dc motor for electric passenger vehicles, 8:32005 (R;US)
Technical and economic analysis of a Rapid-Transit Battery-Storage Substation Project. Final report, 8:32004 (R;US)

Air Force Geophysics Lab., Hanscom AFB, MA (USA)
COCHISE observations of O3 formed by three-body recombination of O and O2. Environmental research papers, 8:32406 (R;US)

Air Products and Chemicals, Inc., Allentown, PA (USA)
Liqiud Phase Methanol Process Development Unit: installation, operation, and support studies. Annual technical progress report No. 4, 28 September 1981-30 September 1982, 8:31056 (R;US)
Liquid-phase methanol process-development unit: installation, operation, and support studies. Technical progress report No. 6, 1 January 1983-31 March 1983, 8:31370 (R;US)

Air Univ., Maxwell AFB, AL (USA). Library
The nuclearization of the Middle East and the subcontinent, 8:32392 (R;US)

Allied-General Nuclear Services, Barnwell, SC (USA)
Studies and research concerning BNFP: evaluation of spent-fuel-examination techniques for the Barnwell Nuclear Fuel Plant, 8:31249 (R;US)

American Inst. of Physics, New York
Interaction between medium energy nucleons in nuclei - 1982, 8:32753 (B;US)

American Planning Association, Chicago, IL
Planner's guide to low-level radioactive waste disposal. Planning Advisory Service report number 369, 8:31268 (R;US)

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Atlanta, GA
Review of 1982 DOE solar budget and future plans for building heating and cooling, 8:31914 (R;US)

Amoco Research Center, Naperville, IL (USA)
Study of ebullated-bed fluid dynamics for H-Coal. Quarterly progress report No. 10, October 1-December 31, 1982, 8:31057 (R;US)

Amsterdam Univ. (Netherlands)
Investigation of phase transitions in solid methane and deuterated derivatives to pressures of 3 kbar, 8:32167 (R;NL)
Valence instabilities in cerium intermetallics, 8:32021 (R;NL)

Analytic Sciences Corp., Reading, MA (USA)
Research progress in dynamic security assessment, 8:31618 (R;US)

Applied Decision Analysis, Inc., Menlo Park, CA (USA)
Framework for assessing EPRI roles in commercial demonstration projects. Final report, 8:31905 (R;US)

Applied Research and Technology of Utah, Orem (USA)
Design and fabrication of a prototype system for photovoltaic residences in the Southwest. ARTU final report, 8:31489 (R;US)

Aptech Engineering Services, Inc., Palo Alto, CA (USA)
Investigation and research of specific combustion-turbine and combined-cycle field problems. Second annual report, 8:31594 (R;US)

Arbeitskreis Telemetrie e.V., Wessling (Germany, F.R.)
6th conference on telemetry, 8:32381 (R;DE)

Argonne National Lab., Idaho Falls, ID (USA)
Remote waste handling at the Hot Fuel Examination Facility, 8:31652 (R;US)

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Arinc Research Corp., Annapolis, MD (USA)
Reliability and availability analyses of coal-fired units: validation of a predictive methodology. Final report, 8:31595 (R;US)

Arizona Univ., Tucson (USA)
Smelter emission controls. The impact on mining and the market for acid. Open file report (final) 1 Oct 80-31 Dec 81, 8:32274 (R;US)

Arizona Univ., Tucson (USA). Dept. of Hydrology and Water Resources
Evaluation of the effectiveness of hydrogen and oxygen isotopes used in concert with chemical water-quality parameters as indicators of subsurface water movement and source, 8:32469 (R;US)

Army Armament Research and Development Command, Watervliet, NY (USA). Large Caliber Weapon Systems Lab.
Laboratory testing of long rod penetrator and sabot components, 8:31247 (R;US)

Army Concepts Analysis Agency, Bethesda, MD (USA)
Integrated Warfare Requirements Methodology (IWRM). Phase I--feasibility study. Final report, 8:32389 (R;US)

Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD (USA)
Problem definition study on the health effects of diethyleneglycol dinitrate, triethyleneglycol dinitrate, and trimethylolethane trinitrate and their respective combustion products. Final report, 8:32606 (R;US)

Army Mobility Equipment Research and Development Command, Fort Belvoir, VA (USA). Electrical Power Lab.
Load effects of Nola-type induction motor power-factor controllers on fuel-cell inverters, 8:31928 (R;US)
Arvin Calspan, Buffalo, NY (USA). Applied Technology Group
Mitigation of biofouling using coatings, year 3. Quarterly progress report No. 2, 8:31593 (R;US)
Atomic Bomb Casualty Commission, Hiroshima (Japan)
Childhood cancer in relation to prenatal exposure to A-bomb radiation, 8:32546 (R;US;In English and Japanese)
Correlations between tests of aging in Hiroshima subjects: an attempt to define physiologic age, 8:32542 (R;JP;In English and Japanese)
Fluoroscopy and radiation therapy exposure reported by ABCC-JNIH Adult Health Study subjects, Hiroshima. Pilot studies, 8:32544 (R;US;In English and Japanese)
JNIH-ABCC Life Span Study Hiroshima and Nagasaki. Report 4. Mortality in A-bomb survivors by age cohorts 1950-59, 8:32545 (R;JP;In English and Japanese)
Atomic Bomb Casualty Commission, Nagasaki (Japan)
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JNIH-ABCC Life Span Study Hiroshima and Nagasaki. Report 4. Mortality in A-bomb survivors by age cohorts 1950-59, 8:32545 (R;JP;In English and Japanese)
Atomic Energy Centre, Dacca (Bangladesh)
Annual scientific report, July 1979-June 1980, 8:32647 (R;BD)
Atomic Energy Control Board, Ottawa, Ontario (Canada)
Falling film flow, heat transfer and breakdown on horizontal tubes, 8:31740 (R;CA)
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Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.
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Atomic Energy of Canada Ltd., Pinawa, Manitoba. Whiteshell Nuclear Research Establishment
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Automation Industries, Inc., Silver Spring, MD (USA). Vitro Labs. Div.
Availability of solar energy reports from the National Solar Data Program, 8:31532 (R;US)

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Babcock and Wilcox Co., Barberton, OH (USA). Fossil Power Generation Div.
6- x 6-ft atmospheric fluidized-bed combustion development facility and commercial-utility AFBC design assessment, 8:31156 (R;US)
Battelle Columbus Labs., OH (USA)
Disposal of spent sorbent from dry FGD (flue gas desulfurization) processes. Final report Oct 79-Jan 81, 8:31610 (R;US)
Operating and maintenance costs survey of FGD systems. Final report, 8:31096 (R;US)
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Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation
National Waste Terminal Storage Program. Technical progress report for the quarter 1 July-30 September 1982, 8:31283 (R;US)
Bay Area Air Quality Management District, San Francisco, CA (USA)
Air quality model validation: application to the San Francisco Bay Area and St. Louis, 8:32422 (R;US)
Bayerische Braunkohlen-Industrie A.G., Schwandorf (Germany, F.R.)
Seventy-five years Bavarian brown coal industry (1906-1981), 8:31119 (R;DE;In German)
Bechtel Group, Inc., San Francisco, CA (USA)
Ecosystem studies, endangered species survey - Gibson Dome and Elk Ridge study areas, Paradox Basin, Utah, 8:31299 (R;US)
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Bendix Corp., Kansas City, MO (USA)
Calibration of hole-in-hole residual-stress measurement technique. Final report, 8:32212 (R;US)
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Thermoset precursor, 8:32096 (TG;US)
Bendix Field Engineering Corp., Grand Junction, CO (USA)
Colorado surface gamma-ray scanner survey. Final report, 8:31307 (R;US)
Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations
US Department of Energy Facilities - Grand Junction, Colorado, and Monticello, Utah: 1982 environmental monitoring report, 8:32475 (R;US)
BENMOL Corp., Alexandria, VA (USA)
Alexandria fluidized-bed process development plant. Annual report, March 1982-February 1983, 8:31147 (R;US)
Alexandria fluidized-bed process-development plant: bubble characteristics, 8:31148 (R;US)
Bettis Atomic Power Lab., West Mifflin, PA (USA)
Fracture-mechanics analysis of iodine stress-corrosion crack propagation in zircaloy tubing used to clad oxide-pellet fuel rods. LWBR Development Program, 8:31660 (R;US)
Stress-corrosion cracking and surface-pitting tests of NiCrFe alloy bolts (LWBR development program), 8:31659 (R;US)
Black and Veatch Consulting Engineers, Kansas City, MO (USA)
Limestone FGD systems data book. Final report, 8:31604 (R;US)
Black Hawk Associates, Denver, CO (USA)
Photovoltaic applications for remote-island needs, 8:31492 (R;US)
Bochum Univ. (Germany, F.R.). Abt. Biologie
Oxygen isotope fractionation during photosynthesis and respiration of the marine diatom Thalassiosira rotula (Meunier), 8:32522 (R;DE;In German)
Bochum Univ. (Germany, F.R.). Abt. Chemie
UV-absorption spectra of chlorine-fluorine derivatives of methane and ethane and of di-nitrogen monoxide in the

wavelength region 160-375 nm at temperatures between 208-298 K and their spectroscopic interpretation, 8:32169 (R;DE;In German)

Bochum Univ. (Germany, F.R.). Inst. fuer Geologie
Effects of rock anisotropy and non-linear material response to fracture on the findings of borehole stress measurements, 8:32637 (R;DE;In German)

Boeing Co., Seattle, WA (USA)
Project Danny Boy. Permanent angular displacement of cylindrical models buried in basalt near an explosion crater. Final report, 8:32396 (R;US)

Bolt, Beranek and Newman, Inc., Cambridge, MA (USA)
Guidelines for environmental monitoring in underground coal mines (phase 1 report). Minerals research contract report 1981-82, 8:31167 (R;US)

Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Algebraic geometry of multimonopoles, 8:32724 (R;DE)
From N=1 to N=4 extended supersymmetric Yang-Mills fields in a covariant Wess-Zumino gauge, 8:32721 (R;DE)

Brandeis Univ., Waltham, MA (USA)
Muons and electrons in general, 8:32356 (R;US)

Brigham Young Univ., Provo, UT (USA). Dept. of Chemical Engineering
Review of membrane separators and zinc-nickel oxide battery development, 8:31791 (R;US)

British Gas Corp., London
Gas interchangeability as applied to the existing range of appliances, 8:31949 (TG;GB)

British Library, Boston Spa. Lending Div.
State of and prospects for automation of energy-supply sources of iron and steel industry enterprises, 8:31977 (R;GB)

Brookhaven National Lab., Upton, NY (USA)
Advantages of spatial and temporal segmentation for detectors at high-luminosity c-w colliders, 8:32316 (R;US)
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Calcium silicate cements for desulfurization of combustion gases. Final report, October 1, 1980-March 31, 1982, 8:31602 (R;US)
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Configuration changes in electron-exchange reactions of metal complexes, 8:32155 (R;US)
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Pulsed Cs beam development for the BNL polarized H^- source, 8:32314 (R;US)
Review of DOE waste-package program. Subtask 1.1. National waste-package program, September 1981-March 1982. Volume 2, 8:31281 (R;US)
Shape reactivity effects it the rod ejection accident, 8:31718 (R;US)
Triggering at high luminosity: fake triggers from pile-up, 8:32315 (R;US)

Bundesanstalt fuer Materialpruefung, Berlin (Germany, F.R.)
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Bundesministerium des Innern, Bonn (Germany, F.R.)
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Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)
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Clarification of the physical and chemical nature of ultrafine aerosols, their generation during different industrial processes, and their retention in the respiratory tract, 8:32407 (R;DE;In German)
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Test plant for pyrolysis of solid waste and sludge with fluid slag removal (Andco - Torrax - System), 8:32264 (R;DE;In German)

Bundesstelle fuer Aussenhandelsinformation, Koeln (Germany, F.R.)
Trinidad and Tobago - energy survey 1980/81, 8:31896 (R;DE;In German)

Bureau de Recherches Geologiques et Minieres (BRGM), 45 - Orleans (France)
Technical and economic feasibility of low-energy geothermal resources in Europe. Final report, 8:31562 (R;XE;FR)
Technical and economic feasibility of low-energy geothermal resources in Europe. Appendices. Final report, 8:31563 (R;XE;FR)

Bureau of Mines, Albany, OR (USA). Albany Research Center
Vanadium roast-leach dissolution from western phosphate tailings. Report of investigations/1982, 8:32044 (R;US)

Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Mining and Safety Research Center
Hydraulic transportation for coal mining, 8:31107 (R;US)

Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center
Design criteria for sheathed permissible explosive charge for open shooting in flammable atmospheres. Report of investigations/1982, 8:31122 (R;US)

Bureau of Mines, Salt Lake City, UT (USA). Salt Lake City Research Center
Extraction of uranium from low-grade ore from McDermitt, Nevada, 8:31244 (R;US)
Extraction of uranium from low-grade ore from Red Desert, Wyoming. National Uranium Resource Evaluation, 8:31243 (R;US)
Extraction of uranium low-grade ores from Great Divide Basin, Wyoming. National Uranium Resource Evaluation, 8:31242 (R;US)

Bureau of Mines, Twin Cities, MN (USA). Twin Cities Research Center
Economic analysis of surface mining mobile equipment fire protection systems. Report of investigations/1982, 8:31168 (R;US)

Burns and Roe Services Corp., Oradell, NJ (USA)
Alexandria fluidized-bed process development plant. Annual report, March 1982-February 1983, 8:31147 (R;US)
Alexandria fluidized-bed process-development plant: bubble characteristics, 8:31148 (R;US)
Evaluation of peat as a utility boiler fuel. Final report, 8:31155 (R;US)

C

California Energy Resources Conservation and Development Commission, Sacramento (USA)
Regulatory boundaries and the development of alternative energy sources. Final report, 8:31820 (R;US)

California Inst. of Tech., Pasadena (USA). W.M. Keck Lab. of Engineering Materials
Structure of glassy early-transition metal - late transition-metal hydrides, 8:31366 (R;US)

California Univ., Berkeley (USA)
Probabilistic steady-state and dynamic security assessment, 8:31613 (R;US)
Rates of convergence for estimation and testing in multinomial distributions, 8:32937 (D;US)

California Univ., Berkeley (USA). Dept. of Electrical Engineering and Computer Sciences
Locating unstable equilibrium points for power-system transient-stability analysis, 8:31612 (R;US)

California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering
Diffusion of gases in porous solids: simulations and measurements. Third quarterly progress report, January 16, 1983-April 15, 1983, 8:32106 (R;US)

California Univ., Davis (USA). Lab. for Energy-Related Health Research
Consideration of age-dependent radium retention in people on the basis of the beagle model, 8:32556 (R;US)

California Univ., Los Angeles (USA). Dept. of Physics
Persistent currents in a rotating superleak partially filled with superfluid helium. Interim report, 8:32687 (R;US)

California Univ., Los Angeles (USA). Inst. of Geophysics and Planetary Physics
Multiple spacecraft observations of interplanetary shocks: characteristics of the upstream ulf turbulence, 8:32656 (R;US)

California Univ., Los Angeles (USA). School of Engineering and Applied Science
Transpired solar air heaters. Final summary report, October 1977-October 1980. Volume 5, 8:31554 (R;US)
Transpired solar air heaters. Volume 4. An investigation of a solar air heater with a selective black thin-channel absorber and multiple Teflon film and glass cover. Final report, 8:31553 (R;US)
Transpired solar air heaters. Volume 2. Experimental and analytical investigations of a glass-tube porous-bed solar air heater. Final report, 8:31552 (R;US)
Transpired solar air heaters. Volume 1. Investigation of transpired porous-bed solar air heaters. Final report, 8:31551 (R;US)

California Univ., San Diego, La Jolla (USA). Dept. of Physics
Theoretical problems of the solid state. Final report 1 Aug 75-30 Apr 82, 8:32769 (R;US)

Cal Recovery Systems, Inc., Richmond, CA (USA)
Significance of size reduction in solid waste management. Volume 3. Effects of machine parameters on shredder performance. Final report Sep 79-Aug 82, 8:32265 (R;US)

Cambridge Econometrics Ltd. (UK)
Reestimation of the EDM in the Netherlands and the reference case. Final report, 8:31812 (R;XE)

Cambridge Univ. (UK). Dept. of Applied Mathematics and Theoretical Physics
Weinberg angle in the supersymmetric Weinberg-Salam model, 8:32722 (R;GB)

Cambridge Univ. (UK). Dept. of Engineering
Solution of two problem cases of non-axisymmetric loading of corrugated bellows by the MARC-CDC General Purpose Structural Analysis program: report to the UKAEA Culham Laboratory, Abingdon, Oxfordshire, 8:32880 (R;GB)

Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Chemical Engineering
Roughness evolution and dendritic growth in zinc electrodeposition from halide electrolytes. Final report, 8:31798 (R;US)

Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Macromolecular Science
Diffuse reflectance Fourier transform infrared spectroscopic study of chemical bonding and hydrothermal stability of an amino silane on metal oxide surfaces. Technical report, 8:32153 (R;US)

Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Metallurgy and Materials Science
Plastic deformation in oxide ceramics. Final report, 8:32074 (R;US)

Catalytic, Inc., Wilsonville, AL (USA)
Wilsonville Advanced Coal-Liquefaction Research and Development Facility, Wilsonville, Alabama. Technical progress report, Run 241 with Illinois 6 coal, 8:31063 (R;US)

Catholic Univ. of America, Washington, DC. Dept. of Chemistry
Ionic transport and electrical relaxation in glass. Proposal for renewal of USDOE contract No. DE-AS05-78ER05781, 1 April 1982-31 Jul 1982, 8:32105 (R;US)

CCS Associates, Bethel Park, PA (USA)
Assessment of the OHZ hydrogen process. Final report, 8:31362 (R;US)

CEA Centre d'Etudes de Limeil, 94 - Villeneuve-Saint-Georges (France)
One dimensional beam. Asymptotic and self similar solutions, 8:32790 (R;FR)

CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)
Application of the pattern recognition technique to fast reactor acoustic monitoring, 8:31721 (R;FR;In French)
Effects of acute and chronic experimental contamination on direct cesium 137 uptake by the eel, Anguilla anguilla L, 8:32550 (R;FR;In French)
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CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)
Corrosion products in PWR cooling circuits, 8:31638 (R;FR;In French)
Evolution of late blood damage from decreasing doses of ^{241}Am following injection in the rat, 8:32551 (R;FR;In French)

CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Inst. de Protection et de Surete Nucleaire
Study of particle deposition in ducts - Optimisation of aerosol sampling pipes, 8:32427 (R;FR;In French)

CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)
Boolean optimization method for reloading a nuclear reactor, 8:31639 (R;FR;In French)
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Radiation protection in the operation of the X-ray generator CGR SECURIX 95030 No. 7, 777 set up at the Pierre Abrami Centre - Hopital Beaujon - Clichy, 8:32549 (R;FR;In French)
Stresses imposed on fuels by changes in power: problems posed and qualification tests, 8:31637 (R;FR;In French)
TOMOGAM, a bidimensional reconstruction method of nuclide repartition in an irradiated nuclear fuel from transversal gamma scanning at various incidences, 8:31680 (R;FR;In French)

CEA, 91 - Orsay (France). Service Hospitalier Frederic Joliot
Lung uptake of ^{11}C-imipramine and ^{11}C-propranolol in patients with sarcoidosis evaluated by positron emission tomography, 8:32526 (R;FR)

Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.
Compilation of results from heat transfer and pressure drop experiments using artificially roughened surfaces in annular channels, 8:31648 (R;GB)
Investigation into the heat transfer performance of helically ribbed surfaces, 8:31681 (R;GB)

Centre National d'Etudes Spatiales, 31 - Toulouse (France)
Study and construction of the epitaxial growth of compound III.V by mixed organometallic and hydride pyrolysis under reduced pressure: application to the study of solar photovoltaic cell structure. Final report, 8:31387 (R;XE;FR)

CHAM of North America, Inc., Huntsville, AL (USA)
VERA2D: program for 2-D analysis of flow, heat, and mass transfer in evaporative cooling towers. Volume 1. Mathematical formulation, solution procedure, and applications. Final report, 8:31596 (R;US)

VERA2D: program for 2-D analysis of flow, heat, and mass transfer in evaporative cooling towers. Volume 2. User's manual. Final report, 8:31597 (R;US)

Chemical Oil Recovery Co., Bakersfield, CA (USA)
Field demonstration of the conventional steam-drive process with ancillary materials. Final report, 8:31186 (R;US)

Chem Systems, Inc., Tarrytown, NY (USA)
Liquid Phase Methanol Process Development Unit: installation, operation, and support studies. Annual technical progress report No. 4, 28 September 1981-30 September 1982, 8:31056 (R;US)
Liquid-phase methanol process-development unit: installation, operation, and support studies. Technical progress report No. 6, 1 January 1983-31 March 1983, 8:31370 (R;US)

Chicago Dept. of Planning, IL (USA)
Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 1. Project overview, 8:31988 (R;US)
Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 3. Regulatory and tax aspects of cogeneration development in Chicago. Energy Management Report CDP-82-2, 8:31990 (R;US)
Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 2. Appendix C: site profiles, 8:31989 (R;US)
Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 4. Environmental aspects of cogeneration development in Chicago. Energy Management Report CDP-82-3, 8:31991 (R;US)

Chicago Univ., IL (USA)
^{182}Hf: a new stopwatch for the early solar system, 8:32651 (R;US)
Isotopic generator for ^{213}Pb and ^{213}Bi, 8:32198 (R;US)
Nuclear physics/chemistry studies. Informal technical progress report, June 1, 1982-May 31, 1983, 8:32739 (R;US)
Particle physics and cosmology. Progress report, September 1, 1982-August 31, 1983, 8:32650 (R;US)
Technical progress report. Theoretical high-energy-physics research at the University of Chicago, 8:32717 (R;US)

Chicago Univ., IL (USA). Dept. of Physics
Research in the theory of condensed matter and elementary particles. Progress report, 8:32729 (R;US)

Chicago Univ., IL (USA). James Franck Inst.
Quark and gluon latent heats at the deconfinement phase transition in SU(3) gauge theory, 8:32716 (R;US)

City Coll., New York (USA)
MPS II drift-chamber system, 8:32357 (R;US)

Clemson Univ., SC (USA). Coll. of Engineering
Feasibility study: a new cable-tray hanger concept for nuclear power plants. Final report, 8:31627 (R;US)

Cloud (Robert L.) Associates, Inc., Berkeley, CA (USA)
Elastic-stress analysis of small-radius U-bend steam-generator tubes. Final report, 8:31641 (R;US)

Cold Regions Research and Engineering Lab., Hanover, NH (USA)
Method for measuring enriched levels of deuterium in soil water. Special report, 8:32111 (R;US)

Colorado Geological Survey, Denver (USA)
Potential sites suitable for relocation and/or reprocessing of the Grand Junction and Rifle uranium-mill-tailings piles, 8:31294 (R;US)

Colorado School of Mines, Golden (USA). Dept. of Metallurgical Engineering
Evaluation of 2 1/4 Cr-1 Mo steel for liquid-lithium containment. III. Effect of velocity and lead content. Unabridged final report, 8:32049 (R;US)

Colorado Univ., Boulder (USA). Dept. of Electrical Engineering
Investigation of motor characteristics when connected to a Nola controller, 8:32215 (R;US)

Colorado Univ., Denver (USA). Medical Center
Chemistry and biology of Tc-99m renal function radiopharmaceuticals. Final report, May 1, 1982-January 15, 1983, 8:32529 (R;US)

Columbia Univ., New York (USA). Dept. of Chemistry
Atomic physics research at Columbia University Chemistry Department. Progress report, April 1, 1982-March 31, 1983, 8:32679 (R;US)

Columbia Univ., New York (USA). Plasma Physics Lab.
Measurement of high-beta tokamak pressure profiles with multipoint Thomson scattering, 8:32800 (R;US)

Combustion Engineering, Inc., Windsor, CT (USA)
Assessment of SPEAR-FCODE-BETA for fuel licensing. Final report, 8:31630 (R;US)

Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Dipartimento Tecnologie Intersettoriali di Base
BC graphics system: reference manual, 8:32924 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Direzione Centrale Sistemi Informativi
COMGRAPH system for control of the output of a videographic terminal, 8:32922 (R;IT;IT)
FS2 system for control of IBM 3270 video-type terminal under MVS/TSO, 8:32923 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Ciclo del Combustibile
Status of scientific research in Italy: the public sector, 8:31833 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Fonti Alternative Rinnovabili e Risparmio Energetico
Anaerobic digestion process: analysis of biochemical and microbiological aspects, 8:31384 (R;IT;In Italian)
Conserving energy via cogenertion, 8:31974 (R;IT;In Italian)
Program for the numerical and graphical definition of shadows in building, 8:31941 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Tecnologie Intersettoriali di Base
Trace element determination in suspended particulate matter from natural waters by instrumental neutron activation analysis: evaluation of the method, 8:32474 (R;IT)

Comitato Nazionale per l'Energia Nucleare, Rome (Italy). Direzione Centrale Studi dell'Energia Nucleare e delle Energie Alternative (ENEA)
Development hypotheses in the countries of the European Community and energy consumption in Italy in the medium term. Final report, 8:31813 (R;XE)

Commission of the European Communities, Luxembourg
Effect of depth and environmental factors on mine workings, 8:31117 (R;XE;In French)
Relationship between raw material quality, behaviour and product quality in the manufacture of high-grade products from lignite, 8:31087 (R;XE;In German)
Repair of coke chamber walls of a coke battery in operation, 8:31066 (R;XE)
Thermoelectric neutron dosimetry: summary of recent results, 8:32360 (R;US)

Commission of the European Communities, Luxembourg. Directorate-General for Research, Science and Education
Extended abstracts of final reports in the field of solar energy applications to dwellings, 8:31521 (R;XE)
Non-fossil derived hydrogen in coal conversion processes: A further study, 8:31363 (R;XE)

Compagnie Generale d'Electricite (CGE), 91 - Marcoussis (France)
Corrosion of chromium-coated steel in sodium polysulfide environments. Final report, 8:31799 (R;US)

Concawe, The Hague (Netherlands)
Performance of oil industry cross-country pipelines in Western Europe - statistical summary of reported spillages, 1981, 8:31211 (R;US)

Connecticut Office of Policy and Management, Hartford (USA)
Connecticut energy data, 8:31913 (R;US)
Connecticut energy situation, 8:31912 (R;US)
Source separation and recycling: a Connecticut guide, 8:31992 (R;US)

Cornell Univ., Ithaca, NY (USA)
Development of polycrystal GaAs solar cells. Final report, 01/15/79-09/30/80, 8:31392 (R;US)

Cornell Univ., Ithaca, NY (USA). Dept. of Structural Engineering
Analysis of reinforced-concrete containment vessels with nonlinear shearing stiffness, 8:31778 (R;US)

Corps of Engineers, St. Paul, MN (USA). St. Paul District
Power plant discharge structure, delta stabilization dike, and on-land taconite tailings disposal, Reserve Mining Company, Silver Bay, Lake County, Minnesota. Final environmental impact statement, 8:31600 (R;US)

Council for Mineral Technology, Randburg (South Africa)
High-speed, multi-input serial-interfacing system for a computer with simultaneous back-up recording on magnetic tape. Report No. M52, 8:32365 (R;ZA)

Review of corrosion inhibitors: theory and practice, 8:32041 (R;ZA)
Council for Scientific and Industrial Research, Stellenbosch (South Africa). National Research Inst. for Oceanology
Wave conditions off Koeberg. Autumn 1979, 8:31698 (R;ZA)
Wave conditions off Koeberg. Autumn 1980, 8:31702 (R;ZA)
Wave conditions off Koeberg. Autumn 1981, 8:31706 (R;ZA)
Wave conditions off Koeberg. Autumn 1978, 8:31694 (R;ZA)
Wave conditions off Koeberg. Spring 1979, 8:31700 (R;ZA)
Wave conditions off Koeberg. Spring 1980, 8:31704 (R;ZA)
Wave conditions off Koeberg. Spring 1977, 8:31692 (R;ZA)
Wave conditions off Koeberg. Spring 1978, 8:31696 (R;ZA)
Wave conditions off Koeberg. Summer 1981, 8:31705 (R;ZA)
Wave conditions off Koeberg. Summer 1978, 8:31693 (R;ZA)
Wave conditions off Koeberg. Summer 1979, 8:31697 (R;ZA)
Wave conditions off Koeberg. Summer 1980, 8:31701 (R;ZA)
Wave conditions off Koeberg. Winter 1981, 8:31707 (R;ZA)
Wave conditions off Koeberg. Winter 1978, 8:31695 (R;ZA)
Wave conditions off Koeberg. Winter 1980, 8:31703 (R;ZA)
Wave conditions off Koeberg. Winter 1979, 8:31699 (R;ZA)
Critical Fluid Systems, Inc., Cambridge, MA (USA)
Assessment of critical-fluid extractions in the process industries. Energy Conversion and Utilization Technology (ECUT) Program: biocatalysis research activity. Final report, 8:31976 (R;US)

D

Dames and Moore, Anchorage, AK (USA)
Natural resource protection and petroleum development in Alaska, 8:31898 (R;US)
Decision Focus, Inc., Los Altos, CA (USA)
Framework for assessing EPRI roles in commercial demonstration projects. Final report, 8:31905 (R;US)
Decision Science Consortium, Inc., Falls Church, VA (USA)
Procedures for using expert judgment to estimate human-error probabilities in nuclear power plant operations, 8:31769 (R;US)
Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center
Aviation turbine fuels, 1982, 8:31215 (R;US)
Economics and analysis of the miscible CO_2 injection project, Granny's Creek field, West Virginia, 8:31181 (R;US)
Motor gasolines, Summer 1982, 8:31214 (R;US)
Department of Energy, Las Vegas, NV (USA). Nevada Operations Office
Nevada nuclear waste storage investigations: briefing book, 8:31270 (R;US)
Department of Energy, Mines and Resources, Ottawa, Ontario (Canada). Mineral Sciences Lab.
Extraction of alumina from fly ash and furnace deposits from Hat Creek coal by the modified lime-sinter process, 8:31097 (R;CA)
Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center
Field-scale experiment in underground gasification of coal at Pricetown, West Virginia, 8:31055 (R;US)
Department of Energy, Oak Ridge, TN (USA). Technical Information Center
Fossil Energy Update: a current awareness journal, 8:31018 (R;US)
Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center
Liquefaction of lignite by the COSTEAM process, 8:31037 (R;US)
MHD combustor designs and materials of construction, 8:31921 (R;US)
Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center
Coal cleaning, physical, 8:31038 (R;US)
Department of Energy, Washington, DC (USA). Energy Information Administration
Petroleum supply monthly, 8:31203 (R;US)
Department of Energy, Washington, DC (USA). Office of Inspector General
Advanced Isotope-Separation Program for uranium enrichment, 8:31804 (R;US)
Excessive costs of drill rigs acquired by the strategic petroleum reserve office-New Orleans, Louisiana, 8:31807 (R;US)
Department of Energy, Washington, DC (USA). Office of Nuclear Energy Programs
Carbon and alloy steel welding fittings (ASME SA-234 with additional requirements), 8:31661 (R;US)
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Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences
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DHR, Inc., Washington, DC (USA)
Active-solar-energy-system materials research priorities, 8:31550 (R;US)
Diamond Shamrock Corp., Painesville, OH (USA). Electrolytic Systems Div.
Oxygen electrodes for energy conversion and storage. Final annual report, 1 October 1980-31 January 1981 and 15 July 1981-31 May 1982, 8:31797 (R;US)

Dortmund Univ. (Germany, F.R.). Abt. Chemietechnik
Material and enthalpy balance of chemical processes, 8:32149 (R;DE;In German)
Duke Power Co., Charlotte, NC (USA)
Feasibility study: a new cable-tray hanger concept for nuclear power plants. Final report, 8:31627 (R;US)
Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.
Bases for DOT exemption uranyl nitrate solution shipments, 8:31263 (R;US)
Hydrogen-Isotope Mass-Spectrometer Evaluation Program. Bimonthly progress report, July/September 1982, 8:32113 (R;US)
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Solid-waste burning in the SWIFT, 8:31274 (R;US)
Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant
Hydrogen-Isotope Mass-Spectrometer Evaluation Program. Bimonthly progress report, July/September 1982, 8:32113 (R;US)
Du Pont de Nemours (E.I.) and Co., Martinsburg, WV (USA). Potomac River Development Lab.
Study of explosive stimulation in Devonian-shale gas wells, 8:31220 (R;US)
Duquesne Light Co., Shippingport, PA (USA)
Duquesne Light Company 1982 annual radiological environmental report. Volume 2, 8:32428 (R;US)
Duquesne Univ., Pittsburgh, PA (USA). Dept. of Chemistry
Hydrogen bonding in asphaltenes and coal liquids. Quarterly report, February 1, 1983-April 30, 1983, 8:31084 (R;US)

E

Earth Power Production Co., Salt Lake City, UT (USA)
Baltazor KGRA and vicinity, Nevada: geothermal reservoir assessment case study, northern Basin and Range province. Final report, 1 October 1978-31 January 1983, 8:31568 (R;US)
Eastern Virginia Medical School, Norfolk (USA)
Effect of petroleum-related pollutants on Aurelia growth and development. Final progress report, September 12, 1977-August 31, 1982, 8:32600 (R;US)
Economic Commission for Europe, New York (USA)
Use of mini-computers for the monitoring and control of all mining sub-systems and for the collection of data needed for management control, 8:31116 (R;XU)
EG and G Idaho, Inc., Idaho Falls (USA)
Analysis of air-temperature measurements from the Three Mile Island Unit 2 reactor building, 8:31734 (R;US)
Annotated bibliography of GEND-sponsored TMI-2 reports, 8:31713 (R;US)
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Energy from municipal solid waste: mechanical equipment and systems status report, 8:31993 (R;US)
Evaluation of system requirements and standards development for thermal annealing of reactor pressure vessels. Progress report, March-September 1982, 8:31646 (R;US)
Forced-convective nonequilibrium post-CHF heat-transfer experiments in a vertical tube, 8:31730 (R;US)
Fouling of a finned-tube heat exchanger in the exhaust of a stationary diesel engine. Final report, 8:32000 (R;US)
Heissdampfreaktor (HDR) steel containment vessel and flood water storage tank structural dynamics test, 8:31777 (R;US)
Interim safety-related criteria for signal isolation devices used in commercial nuclear power plants, 8:31729 (R;US)
LOFT experimental measurements uncertainty analyses. Volume I. Methodology and summary, 8:31764 (R;US)
PBF LOCA test LOC-6 fuel-behavior report, 8:31776 (R;US)
Preliminary electrical-signal-isolation device: evaluation plan, 8:31622 (R;US)
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EG and G, Inc., Goleta, CA (USA)
Beta dosimetry using pulsed laser heating of TLD materials, 8:32761 (R;US)
Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland)
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Rough surface heat transfer and pressure drop, 8:32245 (R;CH)
Energoplan - Vereinigte Beratungs- und Planungsunternehmen e.G., Frankfurt am Main (Germany, F.R.)
Energy as a chance for success, 8:31963 (R;DE;In German)
Energy and Environmental Research Corp., Santa Ana, CA (USA)
Use of sorbents to reduce SO_2 emissions from pulverized coal flames under low-NOx conditions. Progress report Feb-Nov 81, 8:31608 (R;US)
Energy Development Consultants, Inc., Golden, CO (USA)
Evaluation of heavy-oil mining. Final report. Volume 1, 8:31184 (R;US)
Evaluation of heavy-oil mining. Final report. Volume 2, 8:31185 (R;US)
Energy Research and Development Administration, Pittsburgh, PA (USA). Pittsburgh Energy Research Center
Energy from organic wastes: comparison and update, 8:31983 (R;US)
Status of R and D on coal liquefaction, 8:31040 (R;US)
Synthane process update, mid-'77, 8:31039 (R;US)
Entropy Ltd., Lincoln, MA (USA)
SPEAR-BETA fuel-performance code system: fission-gas-release module. Final report, 8:31626 (R;US)
Environmental and Chemical Sciences, Inc., Aiken, SC (USA)
Preliminary Biological Measurement Program in the Savannah River. Final report, 1 March-31 August 1982. Volume I, 8:32467 (R;US)
Environmental Protection Agency, Montgomery, AL (USA). Eastern Environmental Radiation Facility
Environmental radiation data: report 25-26 (January-June 1981), 8:32446 (R;US)
Environmental radiation data: report 27 (July-September 1981), 8:32445 (R;US)
Environmental Protection Agency, Research Triangle Park, NC (USA)
Eddy-correlation measurements of the dry deposition of particulate sulfur and submicron particles, 8:32408 (R;US)
Environmental Quality Systems, Inc., Rockville, MD (USA)
Industrial residue management altenatives for Allegheny County (Pittsburgh) Pennsylvania. Final report 1 Aug 75-31 Jul 77, 8:31980 (R;US)
Environmental Research and Technology, Inc., Westlake Village, CA (USA)
Sulfate Regional Experiment: report of findings. Volume 1. Final report, 8:32411 (R;US)
Sulfate Regional Experiment: report of findings. Volume 2. Final report, 8:32412 (R;US)
Sulfate Regional Experiment: report of findings. Volume 3. Final report, 8:32413 (R;US)
Environmental Resources Management, Inc., West Chester, PA (USA)
Coal ash disposition in Maryland, 1950 through 1980. Volume II. Appendices. Final report, 8:31101 (R;US)
Coal ash disposition in Maryland, 1950 through 1980. Volume I. Final report, 8:31100 (R;US)
Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Fachbereich Mathematik und Physik
Evaluation of kinetic effects observed in resistivity measurements and calorimetric measurements of sorption systems, 8:32161 (R;DE;In German)
Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Fachbereich Medizin
Variability of intraductal papillomas of the mammary gland: Clinical, roentgenologic and morphologic investigations, 8:32532 (R;DE;In German)

Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Technische Fakultaet
Development, simulation, construction and testing of a submarine facility for the desalination of seawater by the principle of reverse osmosis, 8:31830 (R;DE;In German)
Effects of salts dissolved in water vapour on solid fuel gasification, 8:31070 (R;DE;In German)
Essen Univ. (Gesamthochschule) (Germany, F.R.). Fachbereich Energie-, Verfahrens- und Elektrotechnik
Simplified method to determine the influence of heat storage processes on the energy demand of air conditioning systems for large rooms, 8:31945 (R;DE;In German)
Esso Chemie G.m.b.H., Koeln (Germany, F.R.)
Petroleum chemistry 81, 8:31199 (R;DE;In German)
Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)
Evaluation of stainless steel tank corrosion in ICPP high-level radioactive waste service, 8:31275 (R;US)

F

Federal Aviation Administration, Washington, DC (USA). Office of Systems Engineering Management
Impact of petroleum, synthetic and cryogenic fuels on civil aviation. Final report, 8:31201 (R;US)
Federal Energy Regulatory Commission, Washington, DC (USA). Office of Electric Power Regulation
Cowlitz Falls Project FERC No. 2833-Washington. Final Environmental Impact Statement, 8:32492 (R;US)
Fermi National Accelerator Lab., Batavia, IL (USA)
Calculation of the pressure rise in the CHL 5000-gallon liquid-helium dewar, 8:32218 (R;US)
Change in dispersion function from field-gradient errors, 8:32301 (R;US)
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Magnetic monopole bibliography, 1981-1982, 8:32718 (R;US)
Magnetic monopoles: a status report, 8:32709 (R;US)
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Measurement of high-p/sub T/ correlations in 340-GeV/c pp and 280-GeV/c πp p reactions, 8:32708 (R;US)
Report on the production magnet measurement system for the Fermilab Energy-Saver superconducting dipoles and quadrupoles, 8:32216 (R;US)
Response of the Saver Dipole Beam Tube to single-phase helium pressure, 8:32337 (R;US)
RF device for precision location of the beam-position detectors in the Energy Saver, 8:32341 (R;US)
Wide-band neutrino beams at 1000 GeV, 8:32342 (R;US)
Ferrara Univ. (Italy)
Isotopic generator for ^{212}Pb and ^{212}Bi, 8:32198 (R;US)
Florida Univ., Gainesville (USA). Dept. of Physics
Class of conformally invariant quantum field theories, 8:32730 (R;US)
Flow Industries, Inc., Kent, WA (USA). Research and Technology Div.
Hydraulic borehole mining for pitching coal seams. Final report, 8:31109 (R;US)
Foerdergemeinschaft Gutes Licht, Frankfurt am Main (Germany, F.R.)
It is dark at the bottom of the candle, 8:31946 (R;DE;In German)
Forest Products Lab., Madison, WI (USA)
Wood as a source of energy to 1990, 8:31379 (R;US)
Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Darmstadt (Germany, F.R.). Inst. fuer Betriebsfestigkeit
Comparison of fatigue test results for different loading sequences with aid of the Relative-Miner-Rule, 8:32040 (R;DE;In German)
Effect of throat-thickness, plate-thickness and welding procedure on the fatigue strength of high-strength steels, 8:32039 (R;DE;In German)
Model for predicting non-linear crack growth considering load sequence effects (LOSEQ), 8:32038 (R;DE;In German)

G

GA Technologies, Inc., San Diego, CA (USA)
Acoustic resonance in heat-exchanger tube banks. First annual report, 8:31975 (R;US)
Minority ICRF current drive in toroidal devices, 8:32806 (R;US)
New small HTGR power plant concept with inherently safe features - an engineering and economic challenge, 8:31649 (R;US)
Nonlinear theory of lower-hybrid-current drive: a two-dimensional Fokker-Planck study, 8:32805 (R;US)
General Electric Co., Philadelphia, PA (USA)
Systems analysis and ranking of MHD power-consolidation circuits. Final report, 8:31923 (R;US)
General Electric Co., San Jose, CA (USA). Nuclear Energy Systems Div.
Core design and operating data for Quad Cities 1 Cycle 3, 8:31623 (R;US)
General Electric Co., San Jose, CA (USA). Nuclear Fuel and Special Projects Div.
BWR Refill-Reflood Program: Task 4.3 - Single Heated Bundle. Final report, 8:31765 (R;US)
General Electric Co., Schenectady, NY (USA)
Radio-frequency energy in fusion power generation, 8:32828 (R;US)
General Electric Co., Schenectady, NY (USA). Corporate Research and Development Center
Coal gasification catalysis mechanisms. Final report, September 29, 1980 to November 29, 1982, 8:31052 (R;US)
Polarized neutron study of the magnetization density distribution within a $CoFe_2O_4$ colloidal particle (magnetization density in a colloidal $CoFe_2O_4$ crystallite), 8:32104 (R;US)
General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.
Low-pressure-transfer molding of silicon rubber compounds, 8:32093 (R;US)
Pinellas Plant environmental monitoring report, 1982, 8:32431 (R;US)
General Physics Corp., Columbia, MD (USA)
Human-reliability data bank for nuclear-power-plant operations. Volume 2. A data-bank concept and system description, 8:31770 (R;US)
Geological Survey, Denver, CO (USA). Water Resources Div.
Methodology for hydrologic evaluation of a potential surface mine: Loblolly branch basin, Tuscaloosa County, Alabama. Water-resources investigations (final) 1975-81, 8:31124 (R;US)
Georgia Inst. of Tech., Atlanta (USA)
Anaerobic treatment of gasifier effluents. Quarterly report No. 7, 8:31094 (R;US)
Technology-development needs for magnetic fusion, 8:32886 (R;US)
Georgia Inst. of Tech., Atlanta (USA). School of Chemistry
Study of the excited states of ^{197}Pt in the decay of ^{197}Au (8.4 min), 8:32741 (R;US)
Georgia Inst. of Tech., Atlanta (USA). School of Electrical Engineering
Statistical approach to physically based load modeling. Final report, 8:31904 (R;US)
Georgia Inst. of Tech., Atlanta (USA). School of Nuclear Engineering and Health Physics
Ripple reduction coils for tokamak reactors, 8:32887 (R;US)
Gesamthochschule Siegen (Germany, F.R.)
Operation of a high-P/sub T/ spectrometer arm at 10^{33} cm^{-2} sec^{-1} with particle identification, 8:32317 (R;US)
Gesamthochschule Wuppertal (Germany, F.R.)
Experimental analysis of nonlinear problems in solid mechanics, 8:32022 (R;DE)

Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)
Effects of mechanical loads due to power excursions on the reactor tank, 8:31738 (R;DE;In German)
Progress report - list of reports from BMFT, CEA, EPRI, JSTA and USNRC reactor safety research, 8:31739 (R;DE;In German)
Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)
SIS: an accelerator installation for heavy ions of high energy, 8:32294 (TG;US)
Spectroscopy of the 1ssigma-orbital in superheavy collision systems, 8:32681 (R;DE;In German)
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H. Muenchen, Neuherberg (Germany, F.R.). Inst. fuer Strahlenschutz
Migration of radionuclides in sub-surface soil, 8:32459 (R;DE;In German)
Gibbs and Hill, Inc., New York (USA)
Review of economic and technical analysis and identification of important factors for implementation of the construction phase for the Rapid-Transit Battery-Storage Project. Final report, 8:32003 (R;US)
Giner, Inc., Waltham, MA (USA)
Optimization and fabrication of porous carbon electrodes for Fe/Cr Redox flow cells, 8:31930 (R;US)
GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)
Dislocation crack model, as applied to determining the crack toughness of metals, 8:32773 (R;DE;In German)
Goodyear Atomic Corp., Piketon, OH (USA)
Portsmouth Gaseous Diffusion Plant environmental monitoring report for calendar year 1982, 8:32430 (R;US)
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii
Equations of electrodynamics with a noninvariant light velocity, 8:32719 (R;SU;In Russian)
Toroidal magnet for a tokamak with a strong magnetic field and combined adiabatic compression of the pinch, 8:32913 (TG;US)
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki
Longitudinal compression of ion beams, 8:32889 (R;SU;In Russian)
Method for magnetic field calculation using pole configuration and restoration of field configuration by results of magnetic measurements, 8:32304 (R;SU;In Russian)
Spherization of remnants of the asymmetrical supernova explosion in the uniform medium, 8:32653 (R;SU;In Russian)
Study on laser plasma as an ion source for the controlled fusion with heavy ions, 8:32890 (R;SU;In Russian)
Unstable system with Coulomb interaction distorted near the origin, 8:32682 (R;SU)
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij
Acoustic device for determination of the composition of He^3-He^4 gas mixture, 8:32219 (R;SU;In Russian)
Fermions bosonization in two-dimensional models, 8:32731 (R;SU;In Russian)
Post-newtonian gravitational radiation from a binary system of compact objects in field gravitational theory, 8:32652 (R;SU;In Russian)
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Gougeon Brothers, Bay City, MI (USA)
Design and evaluation of low-cost laminated-wood-composite blades for intermediate-size wind turbines: blade design, fabrication concept, and cost analysis, 8:31578 (R;US)
Gulf Universities Research Consortium, Bellaire, TX (USA)
Assessment of water issues associated with enhanced oil recovery: a user's guide, 8:31178 (R;US)

H

Hanford Engineering Development Lab., Richland, WA (USA)
Standards and guidelines applicable to scientific software life cycle, 8:32925 (R;US)
Harvard Univ., Cambridge, MA (USA). Div. of Engineering and Applied Physics
Experimental determination of two-photon and other nonlinear absorption in ultraviolet and infrared window materials. Semiannual technical report 1 Oct 76-31 Mar 77, 8:32238 (R;US)
Hebrew Univ., Jerusalem (Israel)
Twist-boundary energies for metals with long-range pairwise interatomic potentials, 8:32772 (R;US)
Heidelberg Univ. (Germany, F.R.). Inst. fuer Sedimentforschung
Papers of the 1st Neckar ecology symposium, 8:32472 (R;DE;In German)
High Life Helicopters, Inc., Puyallup, WA (USA)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report. Detail area, Volume IIE, 8:31236 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Indian Wells, Texas. Final report. Detail area, Volume IIB, 8:31237 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report, detail area Volume IIC, 8:31239 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report. Detail area, Volume IIA, 8:31238 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Indian Wells, Texas. Final report. Detail area, Volume IIA, 8:31234 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report, detail area Volume IID, 8:31235 (R;US)
Honeywell, Inc., Roseville, MN (USA). Technology Strategy Center
Advanced solar heating and cooling system design and development (404) program. Final report, 8:31520 (R;US)
Houston Univ., TX (USA). Dept. of Chemical Engineering
Energy conservation in industrial operations - method and economics of improved combustion efficiencies. Topical report. Combustion-control systems for process heaters and boilers, 8:32267 (R;US)
Howard-Needles-Tammen and Bergendoff, Charleston, WV (USA)
Solid-waste-management study: Logan County, West Virginia, 8:31987 (R;US)
Howard Univ., Washington, DC (USA)
Development of polycrystal GaAs solar cells. Final report, 01/15/79-09/30/80, 8:31392 (R;US)
Howard Univ., Washington, DC (USA). Dept. of Chemistry
Photoelectron angular distribution and photoionization cross sections for H_2, 8:32678 (R;US)
Theoretical study of radiative interaction and energy-transfer processes of molecular and atomic systems. Final report, 8:32685 (R;US)
HPT, Inc., Thousand Oaks, CA (USA)
Checklist for evaluating emergency operating procedures used in nuclear power plants, 8:31766 (R;US)
Hughes Aircraft Co., El Segundo, CA (USA)
Optical resonance transfer laser (ORTL) development. Final technical report 27 May 80-27 May 82, 8:32235 (R;US)
Hughes Aircraft Co., Los Angeles, CA (USA)
Photovoltaic-array field optimization and modularity study, 8:31391 (R;US)

I

Idaho National Engineering Lab., Idaho Falls (USA)
Testing of portal monitors for personnel contamination control, 8:32458 (R;US)
IEA Coal Research, London (UK). Economic Assessment Service
Constraints on international trade in coal, 8:31159 (R;GB)
IIT Research Inst., Chicago, IL (USA)
Exposure testing and evaluation of solar-utilization materials, 8:31534 (R;US)
Handbook of materials for solar-energy utilization. Low-temperature applications, 8:31535 (R;US)

Illinois State Geological Survey, Urbana (USA)
Geologic investigation of roof and floor strata: longwall demonstration, Old Ben Mine No. 24. Prediction of coal balls in the Herrin Coal. Final technical report: Part 2, 8:31104 (R;US)
Illinois Univ., Urbana (USA)
Estimates of sulfur oxide emissions from the electric utility industry. Volume I: summary and analysis. Final report, 8:31606 (R;US)
Estimates of sulfur oxide emissions from the electric utility industry. Volume II: databook. Final report, 8:31607 (R;US)
Illinois Univ., Urbana (USA). Dept. of Computer Science
Stiff software: what do we have and what do we need, 8:32933 (R;US)
Illinois Univ., Urbana (USA). Dept. of Electrical Engineering
Mathematical issues in inverse problems. Final report. Task II, 8:32792 (R;US)
Illinois Univ., Urbana (USA). Dept. of Physics
Quark and gluon latent heats at the deconfinement phase transition in SU(3) gauge theory, 8:32716 (R;US)
Illinois Univ., Urbana (USA). Electromagnetics Lab.
Adaptation of mathematical methods to electromagnetic modeling. Final report, Task I, 8:32931 (R;US)
Indiana Univ., Bloomington (USA). Dept. of Geology
Leaching of metals and trace elements from sulfide-bearing coal waste in southwestern Illinois, 8:31091 (R;US)
Indian Inst. of Tech., New Delhi. Centre of Energy Studies
Development of an inexpensive solar collector cum storage system for agricultural requirements. Final report, 8:31549 (R;IN)
Institut Jozef Stefan, Ljubljana (Yugoslavia)
Annual report of the Jozef Stefan Institute for 1980, 8:31834 (R;YU;SE)
Institut Max von Laue - Paul Langevin, 38 - Grenoble (France)
Magnetism in the actinides: the role of neutron scattering, 8:32013 (R;US)
INTERA Environmental Consultants, Inc., Houston, TX (USA)
DOT: a nonlinear heat-transfer code for analysis of two-dimensional planar and axisymmetric representations of structures, 8:31284 (R;US)
GEOTHER: a two-phase fluid-flow and heat-transport code, 8:31286 (R;US)
GSM: Geologic Simulation Model for a hypothetical site in the Columbia Plateau - large computer version. Technical report, 8:31287 (R;US)
Porosity, permeability, and their relationship in granite, basalt, and tuff, 8:32640 (R;US)
SALT4: a two-dimensional displacement discontinuity code for thermomechanical analysis in bedded salt deposits, 8:31285 (R;US)
SWENT: a three-dimensional finite-difference code for the simulation of fluid, energy, and solute radionuclide transport. Technical report, 8:32630 (R;US)
VISCOT: a two-dimensional and axisymmetric nonlinear transient thermoviscoelastic and thermoviscoplastic finite-element code for modeling time-dependent viscous mechanical behavior of a rock mass, 8:32639 (R;US)
WAPPA: a Waste Package Performance Assessment code. Technical report, 8:31288 (R;US)
International Atomic Energy Agency, Vienna (Austria)
Emergency response planning for transport accidents involving radioactive materials, 8:31302 (R;XA)
International Centre for Theoretical Physics, Trieste (Italy)
Electric resistivity and structure of liquid alkali metals and alloys as electron-ion plasmas, 8:32020 (R;XA)
International Energy Agency Coal Research, London (UK)
Control of sulphur oxides from coal combustion, 8:32275 (R;US)
International Energy Agency Coal Research, London (UK). Economic Assessment Service
Constraints on international trade in coal, 8:31160 (R;GB)
Methanol production from natural gas or coal, 8:31074 (R;GB)
Iowa Geological Survey, Iowa City (USA)
Seismicity and tectonic relationships of the Nemaha Uplift and Midcontinent geophysical anomaly. Final project summary, 8:32636 (R;US)
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Two-stage decision approach to material accounting, 8:31308 (R;US)
Istituto Universitario di Architettura, Venezia (Italy)
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J

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Solid oxide compounds - properties necessary for fusion applications, 8:32820 (R;US)
JAYCOR, Del Mar, CA (USA)
Thermal model of a cylindrically symmetric solar pond. Solar pond studies: Phase III. Sixth semiannual progress report, 8:31536 (R;US)
JBF Scientific Corp., Wilmington, MA (USA)
Analysis of the effects of integrating wind turbines into a conventional utility: a case study. Revised final report, 8:31572 (R;US)
Jet Propulsion Lab., Pasadena, CA (USA)
Analysis and evaluation in the production process and equipment area of the low-cost solar-array project. Final report, 8:31382 (R;US)
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Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions
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Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics
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JRB Associates, Inc., McLean, VA (USA)
Operation BUSTER-JANGLE, 1951. Technical report, 8:32394 (R;US)
Safety experiments November 1955 - March 1958. Technical report, 8:32393 (R;US)

K

Kansas Geological Survey, Lawrence (USA)
Seismicity and tectonic relationships of the Nemaha Uplift and Midcontinent geophysical anomaly. Final project summary, 8:32636 (R;US)

Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Bio- und Geowissenschaften
Model for explaining the geothermal anomalies of the Rhine graben by deep-strata water flow and its tectonic preconditions and consequences, 8:31564 (R;DE;In German)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Chemie
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Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Chemieingenieurwesen
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Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Wirtschaftswissenschaften
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Katholieke Univ. Nijmegen (Netherlands)
Growth of silicon on a liquid-metal layer. Final report, 8:31388 (R;XE)
Kentucky Natural Resources and Environmental Protection Cabinet, Frankfort (USA)
Comprehensive low-level waste management plan for the State of Kentucky. Sixth quarterly report for the period ending March 31, 1983, 8:31269 (R;US)
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Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Abt. Sicherheit und Strahlenschutz
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Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Chemische Technologie
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Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Plasmaphysik
Real time 155 GHz millimeter wave interferometer module for electron density measurement in large plasma devices, 8:32809 (R;DE)
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung
Approach to a phenomenological description of hydrogen and tritium permeation through steels, and the action of oxide scales to reduce permeation, 8:32026 (R;DE;In German)
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Projektleitung Energieforschung
Implementing agreement of co-operation in the development of large scale wind energy conversion systems, 8:31590 (R;DE)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)
Acoustically measured penetration profiles for a molten metallic pool into river-stone concrete, 8:31768 (R;US)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Hauptabteilung Datenverarbeitung und Instrumentierung
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Genetik und Toxikologie von Spaltstoffen
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik
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Theoretical and practical contribution to the trirotron, a new power UHF amplifier with high efficiency, 8:32260 (R;DE;In German)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Radiochemie
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Technische Physik
TASKA - Tandem Spiegelmaschine Karlsruhe. Vol. 1, 8:32893 (R;DE)
TASKA - Tandem Spiegelmaschine Karlsruhe. Vol. 2, 8:32894 (R;DE)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Lab. fuer Aerosolphysik und Filtertechnik 2
Physico-chemical ^{131}I species in the stack exhaust air of a boiling water reactor, 8:31708 (R;DE;In German)
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Nukleare Sicherheit
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Prozesslenkung mit Datenverarbeitungsanlage
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Study of some numerical problems for SIMMER-II fluid dynamics related to the postdisassembly expansion phase for an LMFBR unprotected loss-of-flow accident, 8:31757 (R;DE)
Verification of the calculation methods for the tight reactor lattices of advanced pressurized water reactors (APWR), 8:31658 (R;DE;In German)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Spaltstoffflusskontrolle
Analysis of decision procedures for a sequence of inventory periods, 8:31309 (R;DE)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekttraegerschaft Fertigungstechnik
Calculation of injection mouldings by simulation models, 8:32094 (R;DE;In German)
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Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Wiederaufarbeitung und Abfallbehandlung
Proceedings of the 4th status report of the Reprocessing and Waste Management Project (PWA) of November 5th, 1981, 8:31250 (R;DE;In German)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Zyklotronlaboratorium
Inherited textures in the bcc phase furnish information about the type of transformation from the fcc phase, 8:32028 (R;DE;In German)
Isoscalar octupole transition rates in ^{50}Ti, ^{52}Cr and ^{208}Pb from model-independent analyses of 104 MeV α-particle scattering, 8:32738 (R;DE)
Kilkeary, Scott and Associates, Inc., Arlington, VA (USA)
Documentation of data inputs to the National Coal Model, 8:31892 (R;US)
KMS Fusion, Inc., Ann Arbor, MI (USA)
X-ray spectral line coincidences between fluorine VIII (and IX) and transition metal lines, 8:32811 (R;US)
Kraftwerk Union A.G., Erlangen (Germany, F.R.)
High-temperature filtration measurements at the Isar BWR Plant. Volume 1. Summary. Final report, 8:31629 (R;US)
Kremen (Seymour S.) and Makhan Jhawar, Coronado, CA (USA)
Lower net pressure reverse osmosis membranes and systems - cost and performance advantages and limitations. Final report, 8:31981 (R;US)
KVB, Inc., Irvine, CA (USA)
Dry SO_2-particulate removal for coal-fired boilers. Volume 1. Demonstration of SO_2 removal on a 22-MW coal-fired utility boiler by dry injection of nahcolite. Final report, 8:31095 (R;US)
Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.
Internal radiation safety at nuclear facilities, 8:31761 (R;JP;JA)

L

Landesanstalt fuer Immissionsschutz des Landes Nordrhein-Westfalen, Essen (Germany, F.R.)
Boundary conditions for air quality evaluation, 8:32417 (R;DE;In German)
Lawrence Berkeley Lab., CA (USA)
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Literature survey of blast and fire effects of nuclear weapons on urban areas. Final report, 8:32395 (R;US)
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Theoretical manual for DYNA3D, 8:32777 (R;US)
Thermal and thermomechanical calculations of deep-rock nuclear waste disposal with the enhanced SANGRE code, 8:32645 (R;US)
Thermal-outgassing behavior of electrodeposited black chromium, 8:32050 (R;US)
Time-dependent behavior of magnetic fields confined by conducting walls, 8:32907 (R;US)
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Use of MATHEW/ADPIC for the evaluation of the environmental impact of proposed OTEC plants. Phase I. Final report, 8:31376 (R;US)
Vertical pneumatic conveying of mixed-particle-sized oil shale, 8:31228 (R;US)
Workshop on sublethal effects of stress on marine organisms, 8:32599 (R;US)
Lehigh Univ., Bethlehem, PA (USA). Center for Surface and Coatings Research
Catalysts for alcohols from biomass. Final technical report, February 1980-January 1983, 8:31380 (R;US)
Lehigh Univ., Bethlehem, PA (USA). Inst. of Thermo-Fluid Engineering and Science
Forced-convective nonequilibrium post-CHF heat-transfer experiments in a vertical tube, 8:31730 (R;US)
Lille-2 Univ., 59 (France)
Boolean optimization method for reloading a nuclear reactor, 8:31639 (R;FR;In French)
Linhardt and Associates, Inc., Newport Beach, CA (USA)
Design and development of a high-temperature particle separator for particle control in coal-gasification plants. Final technical report, 8:31049 (R;US)
Little (Arthur D.), Inc., Cambridge, MA (USA)
Application of the dedicated wire technique to improve coal mine trolley carrier phone communications. Open file report Nov 79-Dec 81, 8:31123 (R;US)
Waste and water management for conventional coal combustion: assessment report, 1980. Final report Sep 79-Oct 80, 8:31609 (R;US)
Lockheed Missiles and Space Co., Inc., Sunnyvale, CA (USA). Energy Systems
Development of a pilot-scale kinetic extruder feeder system and test program. Phase II: verification testing. Quarterly technical progress report, January-March 1983, 8:31067 (R;US)
Logan County Commission, WV (USA)
Solid-waste-management study: Logan County, West Virginia, 8:31987 (R;US)
Los Alamos National Lab., NM (USA)
53 Per, slow, and Be star pulsations. Lecture 8, 8:32654 (R;US)
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Los Alamos Life Sciences Division's biomedical and environmental research programs. Progress report, January-December 1981, 8:32603 (R;US)
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Multiple spacecraft observations of interplanetary shocks: characteristics of the upstream ulf turbulence, 8:32656 (R;US)
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Los Alamos Scientific Lab., NM (USA)
Interaction of the plasma tail of comet Bradfield 1979L on 1980 February 6 with a possibly flare-generated solar-wind disturbance, 8:32655 (R;US)
Louvain Univ. (Belgium)
Optimisation of new types of MIS silicon solar cells. Final report, 8:31385 (R;XE)

M

Mainz Univ. (Germany, F.R.). Fachbereich Medizin
Influence of various disinfectants on the radioimmuno assay for Australia antigen, 8:32538 (R;DE;In German)
Manomet Bird Observatory, MA (USA)
Nontechnical summary of research, January 1978-March 1983, 8:32489 (R;US)
Maryland Univ., College Park (USA). Coll. of Engineering
Cooperative test program on crack-arrest toughness measurements. Final report, 8:31679 (R;US)
Maryland Univ., College Park (USA). Dept. of Agricultural Engineering
Low-cost wind-power system. ASAE Paper No. 82-3005, 8:31576 (R;US)
Maschinenfabrik Augsburg-Nuernberg (M.A.N.) A.G., Muenchen (Germany, F.R.)
Assembly and testing of experimental installation with solar cells and concentration collectors, 8:31493 (R;XE;GE)
Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)
Environmental monitoring report for Pantex Plant covering 1982, 8:32436 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA)
Directions for further development of the HEATRAN code: definition of a new computational code, 8:31657 (R;US)
Twist-boundary energies for metals with long-range pairwise interatomic potentials, 8:32772 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering
Simple LMFBR axial-flow friction-factor correlation, 8:31656 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.
Modeling of fluidized-bed combustion of coal. Volume II. AFBC component models. Final report, 8:31149 (R;US)
Modeling of fluidized-bed combustion of coal. Volume VI. FBC: data base management system user's guide. Final report, 8:31152 (R;US)
Modeling of fluidized-bed combustion of coal. Volume VII. Examples of data base applications users's guide. Final report, 8:31153 (R;US)
Modeling of fluidized-bed combustion of coal. Volume III. AFBC/PFBC system models manual. Final report, 8:31150 (R;US)
Modeling of fluidized-bed combustion of coal. Volume V. FBC - data base management system description. Final report, 8:31151 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Plasma Fusion Center
HESTER: a hot-electron superconducting tokamak experimental reactor at M.I.T., 8:32885 (R;US)
Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.
Carlisle photovoltaic house: first seventeen months. Preliminary report, 8:31490 (R;US)

Massachusetts Univ., Amherst (USA)
Short-cut procedures for the simultaneous design of a process and its control system. Progress report, April 16, 1982-April 15, 1983, 8:32166 (R;US)
Materials Engineering Associates, Inc., Lanham, MD (USA)
Exploratory assessment of postirradiation heat-treatment variables in notch-ductility recovery of A5333-B steel, 8:31678 (R;US)
Max-Planck-Institut fuer Physik und Astrophysik, Muenchen (Germany, F.R.). Inst. fuer Physik
Evidence for X'sub(b) production in the exclusive reaction ϵ'' -> $\gamma X'sub(b)$ ($\gamma\epsilon'$ or $\gamma\epsilon$), 8:32710 (R;DE)
Statistical jet evolution and e^+e^- annihilation into hadrons, 8:32720 (R;DE)
Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)
Sensitivity of the present INTOR layout to variations of some performance objectives, 8:32888 (R;DE)
Total radiation losses and energy balance for ohmically heated divertor discharges in ASDEX, 8:32808 (R;DE)
Max-Planck-Institut fuer Stroemungsforschung, Goettingen (Germany, F.R.)
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Experimental study of NaCl-aerosol production from the vapor phase, 8:32418 (R;DE;In German)
McDonnell Douglas Corp., St. Louis, MO (USA)
Assessment of energetic ion rings versus electron rings for an EBT reactor, 8:32830 (R;US)
Michigan Univ., Ann Arbor (USA)
Influence of water vapor on climate due to an increase in atmospheric carbon dioxide. Final report, January 1, 1980-December 1, 1982, 8:32410 (R;US)
Michigan Univ., Ann Arbor (USA). Dept. of Atmospheric and Oceanic Science
Eddy-correlation measurements of the dry deposition of particulate sulfur and submicron particles, 8:32408 (R;US)
Michigan Univ., Ann Arbor (USA). Radiation Lab.
Large wind turbine siting handbook: television interference assessment. Final subcontract report, 8:31573 (R;US)
Measurements of television interference caused by a vertical-axis wind machine. Final subcontract report, 8:31575 (R;US)
Study of television interference by small wind turbines. Final subcontract report, 8:31574 (R;US)
Mineraloelwirtschaftsverband e.V., Hamburg (Germany, F.R.). Arbeitsgemeinschaft Erdoel-Gewinnung und- Verarbeitung
Annual report 1981, 8:31205 (R;DE;In German)
Ministerium fuer Arbeit, Gesundheit und Soziales des Landes Nordrhein-Westfalen, Duesseldorf (Germany, F.R.)
Coal gasification and coal hydrogenation, 8:31041 (R;DE;In German)
Minnesota Dept. of Energy, Planning and Development, St. Paul (USA)
1983 energy policy & conservation report, 8:31873 (R;US)
Minnesota Energy Agency, St. Paul (USA)
1980 energy policy and conservation biennial report, 8:31853 (R;US)
Mission Research Corp., Albuquerque, NM (USA)
Particle simulations of collective effects in high-current accelerators, 8:32308 (R;US)
Mitchell (Robert D.), Larkspur, CO (USA)
Comparative economics of indirect and direct dry/wet-peaking cooling-tower systems. Final report, 8:31598 (R;US)
Mitre Corp., McLean, VA (USA)
Instrumentation and controls for advanced coal-utilization technologies: requirements, technology status, and R and D needs. Final technical report, August 15, 1980-August 15, 1981, 8:31058 (R;US)
Mobil Research and Development Corp., Princeton, NJ (USA). Central Research Div.
Fundamental studies in the conversion of coals to fuels of increased hydrogen content: the chemistry and mechanism of coal conversion to clean fuel. Final report, 8:31065 (R;US)
Monsanto Research Corp., Miamisburg, OH (USA). Mound
Determination of ^{238}Pu and ^{241}Am in ^{239}Pu by a α-spectrometry, 8:32148 (R;US)
Environmental monitoring at Mound: 1982 report, 8:32437 (R;US)
Vacuum-injection molding of glass-metal electrical components, 8:32262 (R;US)
Muenchen Univ. (Germany, F.R.). Fachbereich Medizin
Investigations on the value of sonographic and radiographic diagnosis of Gall-Bladder diseases. A retrospective assessment of 267 cases, 8:32531 (R;DE;In German)
Nuclear medical investigations of renal transplants in dogs. Early diagnosis of transplant function in comparison with usual methods, 8:32530 (R;DE;In German)
Muenchen Univ. (Germany, F.R.). Fakultaet fuer Medizin
Flow-cytometric examinations on bone marrow and spleen of the rat after whole-body irradiation, 8:32569 (R;DE;In German)
Muenster Univ. (Germany, F.R.). Sonderforschungsbereich 26 Raumordnung und Raumwirtschaft
Concerns of the environment as considered in regional planning, 8:31373 (R;DE;In German)

N

Naemnden foer Energiproduktionsforskning, Stockholm (Sweden)
Compilation and mapping of methods for biomass conversion, 8:31389 (R;SE;SW)
National Academy of Sciences - National Research Council, Washington, DC (USA)
Solar-system space physics in the 1980's: a research strategy. Final report, 8:32658 (R;US)
Strategy for space research in gravitational physics in the 1980's. Final report, 8:32657 (R;US)
National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center
Analysis of the economics of photovoltaic-diesel-battery energy systems for remote applications, 8:31491 (R;US)
Array-structure design handbook for stand-alone photovoltaic applications, 8:31383 (R;US)
Characterization of a high-pressure diesel-fuel injection system as a control-technology option to improve engine performance and reduce exhaust emissions, 8:31999 (R;US)
Implementation of R and QA practices in R and D programs, 8:32001 (R;US)
Structural qualification testing and operational loading on a fiberglass rotor blade for the Mod-0A wind turbine, 8:31579 (R;US)
Tests of an alternating-current propulsion subsystem for electric vehicles on a road load simulator, 8:32006 (R;US)
National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center
Interaction of the plasma tail of comet Bradfield 1979L on 1980 February 6 with a possibly flare-generated solar-wind disturbance, 8:32655 (R;US)
National Board for Science and Technology, Dublin (Ireland)
Energy-flow optimization model - Ireland, 8:31810 (R;XE)
National Bureau of Standards, Boulder, CO (USA)
Heat capacity measurements on structure I and II pure hydrates at low pressures and below room temperature. Final report Oct 81-Sep 82, 8:31222 (R;US)
National Bureau of Standards, Washington, DC (USA)
Overview of research at NBS using synchrotron radiation at SURF-II, 8:32321 (R;US)
Photonuclear reactions above the pion threshold. Final report, 8:32751 (R;US)
Semiconductor measurement technology: graphical solution for the helium leak detector and radioisotope methods of hermetic test - master graphs and instructions. Final report, 8:31330 (R;US)
National Center for Analysis of Energy Systems, Upton, NY (USA)
Estimating public-health risks of air pollution at the national level, 8:32598 (R;US)
National Centre of Systems Reliability, Culcheth (UK)
Reliability assessment of a triggered coal dust explosion barrier, 8:31118 (R;GB)
National Defense Univ., Washington, DC (USA). Research Directorate
Nuclear testing and national security, 8:32390 (R;US)

National Energy Extension Service Advisory Board, Washington, DC (USA)
Fourth annual report to Congress and the Secretary of Energy on the nationwide Energy Extension Service Program, 8:31832 (R;US)
National Energy Information Center, Washington, DC (USA)
EIA publications directory: a user's guide, 8:31801 (R;US)
National Oceanic and Atmospheric Administration, Oak Ridge, TN (USA). Atmospheric Turbulence and Diffusion Lab.
Data interpretation for model development and validation, 8:32404 (R;US)
Eddy-correlation measurements of the dry deposition of particulate sulfur and submicron particles, 8:32408 (R;US)
Survey of the utility of laboratory modeling of atmospheric boundary-layer dispersion and related pnenomena, 8:32405 (R;US)
National Radiological Protection Board, Harwell (UK)
Estimation of long range dispersion and deposition of continuous releases of radionuclides to atmosphere. The third report of a working group on atmospheric dispersion, 8:32440 (R;GB)
Model for long range atmospheric dispersion of radionuclides released over a short period. The fourth report of a working group on atmospheric dispersion, 8:32441 (R;GB)
Procedure to include deposition in the model for short and medium range atmospheric dispersion of radionuclides. The second report of a working group on atmospheric dispersion, 8:32439 (R;GB)
Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)
Mechanical and corrosion behaviour of zirconium alloys under irradiation, 8:32042 (R;SU;In Russian)
Naval Air Development Center, Warminster, PA (USA). Systems Directorate
A general mathematical treatment of hazards to NBC collective protection systems with applications to particular cases. Interim report, 8:32618 (R;US)
Naval Facilities Engineering Command, Alexandria, VA (USA)
Petroleum fuel facilities. design manual 22. Final design criteria, 8:31217 (R;US)
Naval Research Lab., Washington, DC (USA)
Constraints on transportable ion beam power. Memorandum report, 8:32816 (R;US)
Creation of a closed field line compact toroid system by counterstreaming rotating relativistic electron beams. Memorandum report, 8:32675 (R;US)
Energy scaling laws for the racetrack induction accelerator. Final report, 8:32278 (R;US)
Intensity noise and spectral properties of low noise GaAlAs lasers. Interim report, 8:32237 (R;US)
Measurements of laser coupling and plasma profiles in longer-scalelength plasmas. Memorandum report, 8:32814 (R;US)
Nonuniformities in laser-ablated plasma. Memorandum report, 8:32817 (R;US)
Numerical study of phase conjugation in stimulated backscatter with pump depletion. Memorandum report, 8:32236 (R;US)
Saturation of the lower-hybrid-drift instability by mode coupling. Memorandum report, 8:32794 (R;US)
The POSEIDON electron beam generator. Final report, 8:32815 (R;US)
Use of induced spatial incoherence for uniform illumination on laser-fusion targets, 8:32901 (R;US)
X-ray spectral line coincidences between fluorine VIII (and IX) and transition metal lines, 8:32811 (R;US)
Nebraska Univ., Lincoln (USA). Inst. of Agriculture and Natural Resources
Seismicity and tectonic relationships of the Nemaha Uplift and Midcontinent geophysical anomaly. Final project summary, 8:32636 (R;US)
Nelson (R. Wayne) and Associates, Inc., Boulder, CO (USA)
Planning and management of mine-cut lakes at surface coal mines. Final report Aug 81-May 82, 8:31102 (R;US)
New Mexico Univ., Albuquerque (USA). Dept. of Geology
Cenozoic volcanic centers in the New Mexico segment of the Pedregosa Basin: constraints on oil and gas exploration in southwestern New Mexico. Final report, 8:31173 (R;US)
New Mexico Univ., Albuquerque (USA). Dept. of Physics and Astronomy
Thermal model of a cylindrically symmetric solar pond. Solar pond studies: Phase III. Sixth semiannual progress report, 8:31536 (R;US)
New Mexico Univ., Albuquerque (USA). Technology Application Center
Remote sensing of natural resources. Quarterly literature review, fourth quarter, October-December 1982, 8:32632 (R;US)
New York State Dept. of Health, Albany (USA). Div. of Epidemiology
Retention of uranium in the chest: implications of findings in vivo and postmortem, 8:32557 (R;US)
New Zealand Energy Research and Development Committee, Auckland
Cogeneration of heat and electricity in a spray drying plant, 8:31979 (R;NZ)
Effect of disruptions of New Zealand's energy supply on New Zealand society, 8:31819 (R;NZ)
Evaluation of teleconferencing facilities, 8:31809 (R;NZ)
Social and economic effects of a disruption to New Zealand's energy supplies: a study of energy vulnerability and dependence, 8:31854 (R;NZ)
NLO, Inc., Cincinnati, OH (USA)
Feed Materials Production Center environmental monitoring annual report for 1982, 8:32438 (R;US)
North Carolina Agricultural and Technical State Univ., Greensboro (USA)
Development of polycrystal GaAs solar cells. Final report, 01/15/79-09/30/80, 8:31392 (R;US)
North Carolina Dept. of Natural Resources and Community Development, Raleigh (USA). Div. of Land Resources
Geologic map of Region G, North Carolina. Regional Geology Series 2, 8:32629 (R;US)
North Carolina State Univ., Raleigh (USA)
Liquid Li-Pb-Bi, a new tritium breeder, 8:32819 (R;US)
North Dakota Univ., Grand Forks (USA)
Hot-water drying of a lignite slurry in water, 8:31135 (R;US)
Hydrogeological and geotechnical procedures manual for the disposal of fly ash and FGD waste from low-rank coals in Western strip mines, 8:31093 (R;US)
North Dakota Univ., Grand Forks (USA). Dept. of Chemistry
Synthesis of oligomeric models of coal-drived materials for use with GPC calibration. Quarterly report, December 1982-March 1983, 8:31085 (R;US)
Northern Homes of Pennsylvania, Inc., Chambersburg (USA)
Passive and hybrid solar manufactured housing and buildings, phase I. Final report, 8:31519 (R;US)
Northern Illinois Univ., Dekalb (USA)
Logic Machine Architecture: inference mechanisms, 8:32920 (R;US)
Logic Machine Architecture: kernel functions, 8:32921 (R;US)
Northwestern Univ., Evanston, IL (USA)
Logic Machine Architecture: inference mechanisms, 8:32920 (R;US)
Logic Machine Architecture: kernel functions, 8:32921 (R;US)
Northwestern Univ., Evanston, IL (USA). Dept. of Civil Engineering
Hourglass control in linear and nonlinear problems, 8:32918 (R;US)
Northwestern Univ., Evanston, IL (USA). Dept. of Mechanical and Nuclear Engineering
Hourglass control in linear and nonlinear problems, 8:32918 (R;US)
Notre Dame Univ., IN (USA). Dept. of Physics
Quark and gluon latent heats at the deconfinement phase transition in SU(3) gauge theory, 8:32716 (R;US)
Nuclear Regulatory Commission, Arlington, TX (USA). Region IV
Licensee contractor and vendor inspection status report. Quarterly report, January 1983-March 1983, 8:31663 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA)
Report of the NRC Evaluation Team on the quality of construction at the Zimmer Nuclear Power Station, 8:31634 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office for Analysis and Evaluation of Operational Data
Power reactor events, September-October 1982. Volume 4. No. 6, 8:31670 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Administration
Title list of documents made publicly available, January 1-31, 1983. Vol. 5, No. 1, 8:31665 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Inspection and Enforcement
Enforcement actions: significant actions resolved. Quarterly progress report, January-March 1983. Volume 2 No. 1, 8:31668 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation
Containment-emergency-sump performance. Technical findings related to Unresolved Safety Issue A-43, 8:31763 (R;US)
Draft environmental statement related to the operation of Shearon Harris Nuclear Power Plant, Units 1 and 2. Docket Nos. STN 50-400 and STN 50-401, 8:31669 (R;US)
Safety evaluation report related to the operation of Perry Nuclear Power Plant, Units 1 and 2. Docket Nos. 50-440 and 50-441, 8:31667 (R;US)
USI A-43 resolution positions, 8:31762 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management
Licensed operating reactors. Status summary report data as of December 31, 1982, 8:31662 (R;US)
Operating reactors licensing actions summary. Vol. 3, No. 3, 8:31666 (R;US)
Systematic evaluation program. Status summary report. Vol. 5, No. 3, 8:31664 (R;US)
NUS Corp., Gaithersburg, MD (USA)
Radionuclide mass balance for the TMI-2 accident: data-base system and preliminary mass balance. Volume 1, 8:31735 (R;US)
Radionuclide mass balance for the TMI-2 accident: data-base system and preliminary mass balance. Volume 2, 8:31736 (R;US)
NWT Corp., San Jose, CA (USA)
Evaluation of surrogate boilers for steam generators. Final report, 8:31642 (R;US)

O

Oak Ridge Associated Universities, Inc., TN (USA)
Health physics/radiation protection enrollments and degrees, 1982, 8:32793 (R;US)
Oak Ridge Associated Universities thirty-sixth annual report, fiscal year 1982, 8:32915 (R;US)
R and D technological change in coal mining, 8:31121 (R;US)
Oak Ridge Gaseous Diffusion Plant, TN (USA)
Thermodynamic data for uranium fluorides, 8:32203 (R;US)
Use of computers for meeting future challenges in traffic management, 8:31264 (R;US)
Oak Ridge National Lab., TN (USA)
Assessment of energetic ion rings versus electron rings for an EBT reactor, 8:32830 (R;US)
Automatic control of a high-voltage impulse generator by a microcomputer, 8:32380 (R;US)
Development of a long-pulse (30-s), high-energy (120-keV) ion source for neutral-beam applications, 8:32823 (R;US)
Experimental database and design concept for a 1-MW, 200-keV neutral-beam line based on a SITEX negative ion source, 8:32822 (R;US)
Feasibility of zero residential energy growth, 8:31931 (R;US)
In-reactor uniaxial fracture strain of 20%-cold-worked type 316 stainless steel, 8:31653 (R;US)
Management of public impacts in surface mining, 8:31099 (R;US)
Metabolic data and retention functions for the intracellular alkali metals, 8:32523 (R;US)
Microwave transport in EBT distribution manifolds using Monte Carlo ray-tracing techniques, 8:32796 (R;US)
Monitoring for compliance with decommissioning termination survey criteria, 8:31305 (R;US)
Monte Carlo calculations of neutron and gamma-ray energy spectra for fusion reactor shield design: comparison with experiment, 8:32826 (R;US)
National rf technology research and development program plan, 8:32821 (R;US)
Nondestructive testing of metallic sheath for internally cooled superconductor, 8:32829 (R;US)
Nuclear fuel cycle information workshop, 8:31838 (R;US)
Operating manual for the Bulk Shielding Reactor, 8:31711 (R;US)
Poloidal field superconducting ring coil case and support structure design, 8:32827 (R;US)
Pressure-vessel thermal shock at US Pressurized-Water Reactors: events and precursors, 1963-1981, 8:31771 (R;US)
Problem definition study on the health effects of diethyleneglycol dinitrate, triethyleneglycol dinitrate, and trimethylolethane trinitrate and their respective combustion products. Final report, 8:32606 (R;US)
Radio-frequency energy in fusion power generation, 8:32828 (R;US)
Resources, recycle, and substitution, 8:31829 (R;US)
rf coupler technology for fusion applications, 8:32824 (R;US)
Simulation of solar subdivision addresses utility questions about integration of solar photovoltaics, 8:31488 (R;US)
SIS: an accelerator installation for heavy ions of high energy, 8:32294 (TG;US)
Summary report on a survey of light-water-reactor safety systems, 8:31767 (R;US)
Technology of neutral-beam injection based on positive-ion sources, 8:32825 (R;US)
Third neutral-beam-heating workshop: proceedings, 8:32833 (R;US)
Toroidal magnet for a tokamak with a strong magnetic field and combined adiabatic compression of the pinch, 8:32913 (TG;US)
Transport scaling studies for EBT reactor, 8:32795 (R;US)
Oak Ridge Y-12 Plant, TN (USA)
Disposal of waste machining coolants in a biological reactor, 8:32479 (R;US)
Uranium reactions with water vapor. Final progress report, 8:32051 (R;US)
Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna
American 'severe fuel damage program', 8:31780 (R;AT;In German)
Corrected solutions of eigenvalue problems at transient heat with turbulent pipe flow, 8:32248 (R;AT;In German)
Scoping study on the effect of heated shrouds on fuel rod test behaviour, 8:31687 (R;AT;In German)
Whole body autoradiography with mice using 14C-thymidine, 8:32582 (R;AT;In German)
Office of Radiation Programs, Las Vegas, NV (USA)
Emissions of naturally occuring radioactivity: Stauffer elemental phosphorus plant, 8:32447 (R;US)
Emissions of naturally occurring radioactivity: Monsanto elemental phosphorus plant. Report No. 4, 8:32444 (R;US)
Emissions of naturally occurring radioactivity from aluminum and copper facilities. Report No. 6 (final), 8:32442 (R;US)
Emissions of naturally occurring radioactivity: underground zinc mine and mill. Report No. 2 (final), 8:32443 (R;US)
Office of Technology Assessment (U.S. Congress), Washington, DC
Increased automobile fuel efficiency and synthetic fuels: alternatives for reducing oil imports. Background paper 5. Water availability for synthetic fuels: An assessment of current studies, 8:31368 (R;US)
Increased automobile fuel efficiency and synthetic fuels: alternatives for reducing oil imports. background paper number 2: selected technical and economic comparisons of synfuel options, 8:31897 (R;US)
Nuclear proliferation and safeguards. Summary, 8:31316 (R;US)
Ohio State Univ., Columbus (USA). Dept. of Chemical Engineering
Natural-sorbent attrition and elutriation characteristics in fluidized-bed coal combustors, 8:31146 (R;US)
Sulfation kinetics of calcined limestones/dolomites in a thermogravimetric analyzer: experiment, modeling, and simulation, 8:31092 (R;US)
Ohio State Univ., Columbus (USA). Dept. of Physics
Quark and gluon latent heats at the deconfinement phase transition in SU(3) gauge theory, 8:32716 (R;US)
Oklahoma Geological Survey, Norman (USA)
Seismicity and tectonic relationships of the Nemaha Uplift and Midcontinent geophysical anomaly. Final project summary, 8:32636 (R;US)
Oklahoma State Univ., Stillwater (USA). School of Electrical and Computer Engineering
Target assignment for security officers to K targets (TASK), 8:31315 (R;US)
Open Univ., Milton Keynes (UK). Alternative Technology Group
Recycling opportunities for neighbourhoods and communities, 8:31996 (R;US)

Oregon State Univ., Corvallis (USA). Dept. of Atmospheric Science
Time series models for simulating hourly wind power, 8:31577 (R;US)
Oregon State Univ., Corvallis (USA). Dept. of Chemical Engineering
Measuring and modeling solids movement in a large, cold fluidized-bed test facility. Final report, 8:32268 (R;US)
Oregon State Univ., Newport (USA). Marine Science Center
Cycling of transuranic radionuclides in the Columbia River, its estuary and the northeast Pacific Ocean. Progress report, January-December 1982, 8:32483 (R;US)
Owens-Illinois, Inc., Toledo, OH (USA)
Investigation of the nature of semisynthetic esterases. Interim progress report, September 15, 1982-April 15, 1983, 8:32494 (R;US)
Investigation of the nature of semisynthetic esterases. Annual progress report, September 15, 1981-September 14, 1982, 8:32495 (R;US)
Oxford Univ. (UK). Nuclear Physics Lab.
Excited-state giant dipole resonances in (p,γ); a new probe of single-particle strengths, 8:32733 (R;US)

P

Pacific Northwest Lab., Richland, WA (USA)
1981 radon barrier field test at Grand Junction uranium mill tailings pile, 8:31301 (R;US)
Airborne radioactive source terms in compartment fires, 8:32448 (R;US)
Aquatic-pathways model to predict the fate of phenolic compounds, 8:32477 (R;US)
Aquifer restoration at in-situ leach uranium mines: evidence for natural restoration processes, 8:32488 (R;US)
Assessment of SPEAR-FCODE-BETA for fuel licensing. Final report, 8:31630 (R;US)
Catalytic-steam gasification of wood for the production of methanol synthesis gas, 8:31371 (R;US)
Crack growth evaluation for small cracks in reactor-coolant piping, 8:31647 (R;US)
Economics of at-reactor spent fuel storage alternatives, 8:31265 (R;US)
Glass leaching performance, 8:31289 (R;US)
Hanford beta-gamma personnel dosimeter prototypes and evaluation, 8:32366 (R;US)
Impact of improved building thermal efficiency on residential energy demand, 8:31947 (R;US)
Time-dependent model of pollutant transport and diffusion in mountain valleys, 8:32419 (R;US)
Tumorigenic and tumoricidal actions of ionizing radiations, 8:32583 (R;US)
Well-logging probe for measuring tritium: construction and operating manual, 8:32386 (R;US)
PAR Enterprises, Inc., Fairfax, VA (USA)
Assessment of the BCL and ORNL chemical heat pumps, 8:31939 (R;US)
Pennsylvania State Univ., University Park (USA)
Hydrogen absorption in metals: a field-ion microscopy study. Technical progress report, June 1, 1981-June 30, 1983, 8:32018 (R;US)
Pennsylvania State Univ., University Park (USA). Center for Air Environment Studies
Research on acoustically generated turbulence, 8:32214 (R;US)
Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering
Laser micropyrolysis of coal macerals. Annual report 1 Oct 81-30 Sep 82, 8:31088 (R;US)
Pennsylvania State Univ., University Park (USA). Noll Lab. for Human Performance Research
Personal cooling in nuclear power stations. Final report, 8:31621 (R;US)
Physical Sciences, Inc., Andover, MA (USA)
Hot-gas cleanup for molten carbonate fuel cells: dechlorination and soot formation. Quarterly report, September 16-December 15, 1982, 8:31929 (R;US)
Physics International Co., San Leandro, CA (USA)
DYNAFRAC - application of a novel rock fracturing method to oil and gas recovery. Final report, 8:31183 (R;US)
Physikalisch-Technische Bundesanstalt, Braunschweig (Germany, F.R.). Abt. Waerme
Critical investigation of pressure measuring methods in the testing of explosion-proof electrical machinery, 8:32256 (R;DE;In German)
Picotera Systems, Inc., Corvallis, OR (USA)
Time series models for simulating hourly wind power, 8:31577 (R;US)
Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering
Experimental study of multiple steady states in an adiabatic coal liquefaction reactor. Progress report, September 1, 1982-February 28, 1983 , 8:31059 (R;US)
Policy Planning and Evaluation, Inc., McLean, VA (USA)
Documentation of International Energy Evaluation System. Volume 1. Overview, 8:31847 (R;US)
Documentation of International Energy Evaluation System. Volume 3, Part 1, 8:31849 (R;US)
Documentation of International Energy Evaluation System. Volume 3. Part 2, 8:31850 (R;US)
Documentation of International Energy Evaluation System. Volume 2, 8:31848 (R;US)
Princeton Univ., NJ (USA)
Renormalized theory of drift wave turbulence in sheared magnetic fields, 8:32813 (D;US)
Princeton Univ., NJ (USA). Plasma Physics Lab.
Mechanical engineering aspects of TFTR, 8:32902 (R;US)
Radio-frequency energy in fusion power generation, 8:32828 (R;US)
Purdue Univ., Lafayette, IN (USA). Dept. of Chemistry
Reactions of metal ions and their clusters in the gas phase using laser ionization - ion cyclotron resonance spectroscopy. Progress report July 1, 1982-June 30, 1983, 8:32157 (R;US)
Purdue Univ., Lafayette, IN (USA). School of Chemical Engineering
Case studies of a COED-based coal-conversion process. Final report, August 1, 1979-July 15, 1980, 8:31050 (R;US)
Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering
Laser velocimeter measurements and analysis in turbulent flows with combustion. Part I. Interim report 1 Jan-31 Dec 81, 8:32266 (R;US)

Q

QEB, Inc., Lakewood, CO (USA)
Airborne gamma-ray spectrometer and magnetometer survey: Indian Wells, Texas. Final report. Detail area, Volume IIA, 8:31234 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Indian Wells, Texas. Final report. Detail area, Volume IIB, 8:31237 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report. Detail area, Volume IIA, 8:31238 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report, detail area Volume IID, 8:31235 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report. Detail area, Volume IIE, 8:31236 (R;US)
Airborne gamma-ray spectrometer and magnetometer survey: Dryden, Texas. Final report, detail area Volume IIC, 8:31239 (R;US)

R

Radian Corp., Austin, TX (USA)
Limestone FGD systems data book. Final report, 8:31604 (R;US)
Pilot study of time variability of elemental concentrations in power-plant ash. Final report, 8:31086 (R;US)

RAND Corp., Santa Monica, CA (USA)
Military criteria for NATO TNF options for the 1980s, 8:32391 (R;US)
U.S. strategic force planning: restoring the links between strategy and capabilities, 8:32209 (R;US)
Research Planning Inst., Inc., Columbia, SC (USA)
Determine fates of several oil spills in coastal and offshore waters and calculate a mass balance denoting major pathways for dispersion of the spilled oil. Final report, 8:31210 (R;US)
Resource Dynamics Corp., McLean, VA (USA)
Cogeneration: regulation, economics and capacity. Volume 1. Regulation, 8:31842 (R;US)
RE/SPEC, Inc., Rapid City, SD (USA)
Evaluation of the thermomechanical behavior about a waste container/sleeve in salt, 8:32638 (R;US)
Reynolds Electrical and Engineering Co., Inc., Las Vegas, NV (USA)
Assessment of change in shallow land burial limits for defense transuranic waste, 8:31271 (R;US)
Big-hole drilling - the state of the art, 8:32397 (R;US)
Rhode Island Univ., Kingston (USA). Dept. of Physics
Polarized neutron study of the magnetization density distribution within a $CoFe_2O_4$ colloidal particle (magnetization density in a colloidal $CoFe_2O_4$ crystallite), 8:32104 (R;US)
Rochester Univ., NY (USA). Dept. of Radiation Biology and Biophysics
Criteria for electric field bioeffects investigations and risk assessment, 8:32617 (R;US)
Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant
Compendium of fluorine data, 8:32162 (R;US)
Environmental Sciences Branch semiannual progress report for July-December 1981, 8:32449 (R;US)
Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations
Analysis of the Three Mile Island Unit 2 hydrogen burn. Volume 4, 8:31733 (R;US)
Basalt Waste Isolation Project: drilling and testing. Quarterly report, October 1, 1982-December 31, 1982, 8:31290 (R;US)
Characterization of reference materials for the Barrier Materials Test Program, 8:31291 (R;US)
Investigation of occupational illnesses at the 222-S building on December 8, 1982, 8:32620 (R;US)
Liquid waste discharged to ground in the 200 Areas through fourth quarter 1982: nonradiological parameters, 8:32478 (R;US)
Radioactive liquid wastes discharged to ground in the 200 areas during 1982, 8:31292 (R;US)
Rockwell International Corp., Thousand Oaks, CA (USA). Microelectronics Research and Development Center
Development of polycrystal GaAs solar cells. Final report, 01/15/79-09/30/80, 8:31392 (R;US)
Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO (USA)
Review of uranium spoil and mill tailings revegetation in the western United States, 8:31300 (R;US)
Roth Associates, Inc., Rockville, MD (USA)
Planning studies for measurement of chemical emissions in stack gases of coal-fired power plants. Final report, 8:31605 (R;US)
Rutgers--the State Univ., New Brunswick, NJ (USA). Dept. of Physics
High-pressure electron-resonance studies of electronic, magnetic, and structural phase transitions. Progress report, 8:32019 (R;US)

S

Saint Louis Univ., MO (USA)
Research in seismology. Semi-annual technical report 1 Oct 76-31 Mar 77, 8:32399 (R;US)
Sandia National Labs., Albuquerque, NM (USA)
1982 Environmental monitoring report, Sandia National Laboratories, Albuquerque, New Mexico, 8:32450 (R;US)
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Light-water-reactor safety-technology program. Quarterly report, October-December 1982, 8:31781 (R;US)
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Sandia National Labs., Livermore, CA (USA)
TACO3D: a three-dimensional finite-element heat-transfer code, 8:32787 (R;US)
Santa Fe Energy Co., Santa Fe Springs, CA (USA). Western Div.
200 Sand Steamflood Demonstration Project, Fifth annual report, June 1980-June 1981, 8:31182 (R;US)
Sargent and Lundy, Chicago, IL (USA)
Low-level radwaste solidification, 8:31276 (R;US)
Savannah River Ecology Lab., Aiken, SC (USA)
Ecology of southeastern shrub bogs (pocosins) and Carolina bays: a community profile, 8:32468 (R;US)
Schweizerische Bankgesellschaft, Zurich
No future without energy, 8:31851 (R;CH;In German)
Schweizerischer Handels- und Industrie-Verein, Zurich
Fundamental necessities for a sound economy; What does energy mean for the Swiss economy, 8:31800 (R;CH;In German)
Science Applications, Inc., La Jolla, CA (USA)
Assessment of energetic ion rings versus electron rings for an EBT reactor, 8:32830 (R;US)
Science Applications, Inc., Marietta, GA (USA)
SIMULATE-E: a nodal core-analysis program for light-water reactors. Computer code user's manual, 8:31624 (R;US)

Science Applications, Inc., Oak Brook, IL (USA)
Beam brightness in low-beta linacs: a sensitivity study, 8:32832 (R;US)
Science Applications, Inc., Pleasanton, CA (USA)
Assessment of change in shallow land burial limits for defense transuranic waste, 8:31271 (R;US)
Science Research Council, Chilton (UK). Rutherford and Appleton Labs.
Electron excitation in atoms and molecules by neutron-nucleus scattering, 8:32752 (R;GB)
Observations of ultraviolet spectra of H II regions and galaxies with IUE, 8:32659 (R;GB)
Scientific Service, Inc., Redwood City, CA (USA)
Damage function rating procedure for flat slab basement shelters. Final report, 8:32210 (R;US)
Senat fuer Energieeinsparung, Hamburg (Germany, F.R.)
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Service Central de Protection contre les Rayonnements Ionisants, 78 - Le Vesinet (France)
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Monthly results of measurements, October 1981, 8:32451 (R;FR;In French)
SETS, Inc., Honolulu, HI (USA)
Suitability of salt-gradient solar ponds for electrical power generation in the US Trust Territory of the Pacific Islands, Guam, and American Samoa, 8:31515 (R;US)
Smithsonian Institution, Rockville, MD (USA). Radiation Biology Lab.
Primary light-harvesting system: phycobilisomes and associated membranes. Progress report, December 1979-January 1983, 8:32493 (R;US)
South Coast Technology, Inc., Ann Arbor, MI (USA)
Advanced hybrid vehicle propulsion system study, 8:32008 (R;US)
Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center
Special Research Service agreement, CMTC/U.S. DOE. Final report, 1 July 1981-30 June 1982, 8:31112 (R;US)
Southern Research Inst., Birmingham, AL (USA)
Planning studies for measurement of chemical emissions in stack gases of coal-fired power plants. Final report, 8:31605 (R;US)
Southwest Research Inst., San Antonio, TX (USA)
Residual stresses in LP turbine discs. Final report, 8:31631 (R;US)
Study of the behavioral and biological effects of high-strength 60-Hz electric fields. Quarterly technical progress report number 10, 18 December 1982-18 March 1983, 8:31603 (R;US)
Spectron Development Labs., Inc., Costa Mesa, CA (USA)
Experimental investigation of synfuel spray characteristics and combustion dynamics. Final technical report, 15 September 1980-15 November 1982, 8:31060 (R;US)
SRI International, Menlo Park, CA (USA)
Collisional mechanisms in D^- beam sources for MFE experiments and reactors. Progress report No. 13, quarter ending March 31, 1982, 8:32883 (R;US)
Exploratory study of coal-conversion chemistry. Quarterly report No. 7, November 19, 1982-February 18, 1983, 8:31062 (R;US)
Stagg Systems, Inc., Tustin, CA (USA)
Human-factors review of electric-power-dispatch control centers. Volume 5. Information management and presentation summary. Final report, 8:31906 (R;US)
Human-factors review of electric-power-dispatch control centers. Volume 6. Information management and presentation. Final report, 8:31614 (R;US)
Stanford Linear Accelerator Center, CA (USA)
Annual environmental monitoring report, January-December 1982, 8:32454 (R;US)
Fabrication of tungsten wire needles, 8:32048 (R;US)
Stanford Univ., CA (USA)
Low-cost process for p-n junction-type solar cell. Final report, March 1, 1981-May 31, 1982, 8:31393 (R;US)
Stanford Univ., CA (USA). Dept. of Chemistry
Internal energy distribution of the parent molecule and its photofragments following ir multiphoton absorption. Final scientific report, April 1, 1981-September 30, 1982, 8:32179 (R;US)
Stanford Univ., CA (USA). Dept. of Statistics
Pilot study of time variability of elemental concentrations in power-plant ash. Final report, 8:31086 (R;US)
Stanford Univ., CA (USA). Systems Optimization Lab.
Pricing underemployed capacity in a linear economic model. Technical report SOL 79-2, 8:31818 (R;US)
State Univ. of New York, Buffalo (USA)
Catalytic coal liquefaction. Quarterly report, January-March 1983, 8:31061 (R;US)
Stoller (S.M.) Corp., New York (USA)
Evaluation and modification of COMETHE III-J. Final report, 8:31628 (R;US)
Stuttgart Univ. (Germany, F.R.)
Theoretical model of the thermal decomposition of single coal grains, 8:31071 (R;DE;In German)
Stuttgart Univ. (Germany, F.R.). Abt. Reaktorphysik
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Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme
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Stuttgart Univ. (Germany, F.R.). Inst. fuer Plasmaforschung
Development of high turbulent plasma states by exchange instabilities of m = 0 type, 8:32807 (R;DE;In German)
Sumitomo Electric Industries Ltd., Osaka (Japan)
Thermoset precursor, 8:32096 (TG;US)
Syracuse Univ., NY (USA)
Operation of a high-P/sub T/ spectrometer arm at 10^{33} cm^{-2} sec^{-1} with particle identification, 8:32317 (R;US)
Surface characterization of catalytically active metal, alloy, and compound films. Final report, September 1, 1977-April 30, 1983, 8:32017 (R;US)
System-Management Hans O. Rasche + Partner G.m.b.H., Heiligenhaus (Germany, F.R.)
Energy as a chance for success, 8:31963 (R;DE;In German)
Systems, Science and Software, La Jolla, CA (USA)
The contribution of two-dimensional source effects to the far-field seismic signatures of underground nuclear explosions. Topical report, 8:32400 (R;US)

T

TAL Research and Development, New York (USA)
Geology, drill holes and geothermal energy potential of basal Cambrian rock units of the Appalachian basin of New York state. Final report, 8:31566 (R;US)
Technical Report Services, Rocky River, OH (USA)
Design and evaluation of low-cost laminated-wood-composite blades for intermediate-size wind turbines: blade design, fabrication concept, and cost analysis, 8:31578 (R;US)
Technion-Israel Inst. of Tech., Haifa. Dept. of Mechanical Engineering
Modeling of natural-circulation phenomena in nuclear-reactor cooling loops. Final report, 8:31732 (R;US)
Technische Hochschule Aachen (Germany, F.R.)
Growth of helium bubbles in AISI 316 austenitic stainless steel, 8:32027 (R;DE;In German)
Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen
Driving a wedge-shaped chisel into a rock - experimental and theoretical studies, 8:31120 (R;DE;In German)

Experimental studies on the driving dynamics of mine locomotives driven by accumulator batteries, 8:32007 (R;DE;In German)

Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen

Experimental study and reaction yield considerations of vanadium/chlorine- and vanadium/bromine-multistep processes for the thermochemical production of hydrogen, 8:31364 (R;DE;In German)

Technische Hochschule Aachen (Germany, F.R.). Lehrstuhl und Inst. fuer Siedlungswasserwirtschaft

Saving of energy by the use of the adsorption-activated sludge process (A-A-treatment), 8:31978 (R;DE;In German)

Technische Hochschule Aachen (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet

Behaviour of coal minerals under coal gasification conditions, 8:31072 (R;DE;In German)

Studies on the synthesis of lubricating oils using olefins from technical C_3-fractions, 8:31200 (R;DE;In German)

Technische Hochschule Aachen (Germany, F.R.). Medizinische Fakultaet

Lead in the environment and its effects on man, 8:32605 (R;DE;In German)

Technische Hochschule Darmstadt (Germany, F.R.). Fachbereich Maschinenbau

Experimental and theoretical determination of pressure changes after entry of a high-speed train into a tunnel, 8:32269 (R;DE;In German)

Technische Hogeschool Twente, Enschede (Netherlands)

Candidate technologies to relieve the European energy system, 8:31811 (R;XE)

Technische Univ. Berlin (Germany, F.R.). Fachbereich Bergbau und Geowissenschaften

Studies on improved recognition of cyclic stratification in case of homogeneous and stratified caprock, 8:31105 (R;DE;In German)

Technische Univ. Berlin (Germany, F.R.). Fachbereich Landschaftsentwicklung

Effects of ozone and cadmium on the CO_2 assimilation and transpiration of Nicotiana tabacum L. and Phaseolus vulgaris L., 8:32604 (R;DE;In German)

Technische Univ. Berlin (Germany, F.R.). Fachbereich Physikalische Ingenieurwissenschaft

Parameter excited oscillations in shaft hoisting systems, 8:32228 (R;DE;In German)

Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen

Construction and operation of a plant for continuous liquefaction of solid fuels, 8:31068 (R;DE;In German)

Investigations to characterize hydrogenation products made of bituminous coal, 8:31216 (R;DE;In German)

Technische Univ. Muenchen (Germany, F.R.). Fakultaet fuer Elektrotechnik

Study of instabilities in the electrical properties of the Si-SiO_2 boundary surface, 8:32080 (R;DE;In German)

Technische Werke der Stadt Stuttgart A.G. (Germany, F.R.)

Technical Works of Stuttgart AG - annual business report 1981, 8:31994 (R;DE;In German)

Terra Tek, Inc., Salt Lake City, UT (USA)

Lightweight proppants for deep-gas-well stimulation. Third annual report, July 1, 1981-June 30, 1982, 8:31219 (R;US)

Texas A and M Univ., College Station (USA). Coll. of Geosciences

Optimization of rock-cutting tools used in coal mining, 8:31125 (R;US)

Texas A and M Univ., College Station (USA). Research Foundation

Assessment of data availability, quality, and needs for the gas industry. Final report Apr 81-Mar 82, 8:31221 (R;US)

Texas Univ., Austin (USA)

Tertiary oil-recovery-processes research at the University of Texas. Final report, 8:31179 (R;US)

Texas Univ., Austin (USA). Bureau of Economic Geology

Atoka Group (Lower to Middle Pennsylvanian), northern Fort Worth Basin, Texas: terrigenous depositional systems, diagenesis, and reservoir distribution and quality. Report of investigations No. 125, 8:31175 (R;US)

Frio Formation of the Texas Gulf Coast Basin: depositional systems, structural framework, and hydrocarbon, origin, migration, distribution, and exploration potential. Report of investigations No. 122, 8:31187 (R;US)

Lithology, microstructures, fluid inclusions, and geochemistry of rock salt and of the cap-rock contact in Oakwood Dome, East Texas: significance for nuclear waste storage. Report of investigations No. 120, 8:32621 (R;US)

Petroleum potential of the Palo Duro Basin, Texas Panhandle. Report of investigations No. 123, 8:31172 (R;US)

Regional hydrodynamics and hydrochemistry of the uranium-bearing Oakville aquifer (Miocene) of south Texas. Report of investigations No. 124, 8:31240 (R;US)

Wilcox sandstone reservoirs in the deep subsurface along the Texas Gulf Coast: their potential for production of geopressured geothermal energy. Report of Investigations No. 117, 8:31565 (R;US)

Texas Univ., Austin (USA). Center for Research in Water Resources

Solid wastes in the petrochemical industry. Technical report EHE-72-14, 8:31209 (R;US)

Texas Univ., Austin (USA). Dept. of Chemical Engineering

Eddy-correlation measurements of the dry deposition of particulate sulfur and submicron particles, 8:32408 (R;US)

Texas Univ., Austin (USA). Inst. for Fusion Studies

Reduced magnetohydrodynamics and the Hasegawa-Mima equation, 8:32804 (R;US)

Scattering of regularized-long-wave solitary waves, 8:32803 (R;US)

Texas Univ., Austin (USA). Inst. of Latin American Studies

Petroleum: an alternative for Mexican development. Technical papers series No. 19, 8:31174 (R;US;SP)

Tieraerztliche Hochschule Hannover (Germany, F.R.)

Study of the effects of a ^{60}Co-irradiation on the hatchability of chicken eggs, 8:32579 (R;DE;In German)

Tohoku Univ., Sendai (Japan)

Investigation of the prompt-neutron spectrum for spontaneously-fissioning ^{252}Cf, 8:32748 (R;US)

Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study

Beam spill control with frequency modulation in electron synchrotron, 8:32343 (R;JP;In Japanese)

High voltage pulsing system for wire spark chambers, 8:32362 (R;JP;In Japanese)

QUAD TAG MODULE, 8:32344 (R;JP;In Japanese)

Study on superconducting accelerating cavities, 8:32354 (R;JP;In Japanese)

Study on superconducting accelerating cavities, 2, 8:32355 (R;JP;In Japanese)

TRW Energy Development Group, Redondo Beach, CA (USA)

RF plasma sources for neutral beam injection systems. Final technical progress report, 8:32881 (R;US)

TRW Energy Systems Group, Redondo Beach, CA (USA)

Development of BEACON technology. Quarterly report, January-March 1981, 8:31051 (R;US)

Tuebingen Univ. (Germany, F.R.). Fakultaet fuer Chemie und Pharmazie

Investigations on the insulin receptor of isolated fat cells, 8:32517 (R;DE;In German)

Tufts Univ., Medford, MA (USA)

Measurement of high-p/sub T/ correlations in 340-GeV/c pp and 280-GeV/c π^- p reactions, 8:32708 (R;US)

U

UKAEA Atomic Energy Establishment, Winfrith

Dryout experiments in a 25-rod 12 long bundle under PWR and other conditions, 8:31636 (R;GB)

Production of methylene blue and sodium fluorescein aerosols with the May spinning top aerosol generator, 8:32402 (R;GB)

UKAEA Atomic Energy Establishment, Winfrith. Safety and Engineering Science Div.

Gamma-neutron interaction method for saturation measurements in EOR flood experiments, 8:31176 (R;GB)

UKAEA Atomic Energy Establishment, Winfrith. Technology Div.

Number concentrations of solid particles from the spinning top aerosol generator, 8:32211 (R;GB)

UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.

Positron annihilation measurements on cured epoxide resins, 8:32089 (R;GB)

Positron annihilation studies of nickel and steel electrolytically charged with hydrogen, 8:32011 (R;GB)

UKAEA Atomic Energy Research Establishment, Harwell. Materials Physics Div.

Room temperature study of uranium dioxide by pulsed neutron powder diffraction, 8:32070 (R;GB)

UKAEA Atomic Energy Research Establishment, Harwell. Nuclear Physics Div.

Stabilizer for the Harwell Tandem Van de Graaff, 8:32311 (R;GB)

UKAEA Risley Nuclear Power Development Establishment

Experience with a servo-hydraulic mechanical testing machine installed in a new shielded active facility at Windscale Nuclear Power Development Laboratories, 8:32227 (R;GB)

UKAEA Risley Nuclear Power Development Establishment, Culcheth. Safety and Reliability Directorate

Development of CRUNCH: a dispersion model for continuous releases of a denser-than-air vapour into the atmosphere, 8:32420 (R;GB)

GASEX 1: a general one-dimensional code for gas cloud explosions, 8:31783 (R;GB)

Union Carbide Corp., Oak Ridge, TN (USA). Office of Health, Safety, and Environmental Affairs

United States Department of Energy Oak Ridge Facilities environmental-monitoring report, 8:32455 (R;US)

United Technologies Research Center, East Hartford, CT (USA)

Large gas-turbine modifications for solar-fossil hybrid operation. Final report, 8:31516 (R;US)

Universidade do Estado do Rio de Janeiro (Brazil). Centro Biomedico

Study of the immune response to thyroglobulin through a model of experimental autoimmune thyroiditis, 8:32543 (R;BR;In Portuguese)

Universidade do Estado do Rio de Janeiro (Brazil). Inst. de Biologia

Contribution to the study of calcium metabolism in the deficiency of testosterone, 8:32521 (R;BR;In Portuguese)

University of Southern California, Los Angeles (USA)

Evaporation-driven liquid sintering. Final report, 8:32075 (R;US)

Urban Systems Research and Engineering, Inc., Cambridge, MA (USA)

Institutional constraints and public acceptance barriers to utilization of municipal wastewater and sludge for land reclamation and biomass production, 8:31995 (R;US)

URS/John A. Blume and Associates, Engineers, San Francisco, CA (USA)

Vibration testing of an epoxy-repaired reinforced concrete test structure, 8:32220 (R;US)

USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC

Comprehensive program and plan for federal energy education, extension and information activities. The sixth report to Congress. P.L. 95-39, Title V, Section 508, National Energy Extension Service Act and P.L. 96-294, Section 404, Energy Security Act, 8:31997 (R;US)

USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Computer Services and Telecommunications Management

Communications Managers Workshop. Summary of proceedings, 8:32914 (R;US)

USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Converter Reactor Deployment

Nuclear power program information and data. Update, October-December 1982, 8:31635 (R;US)

USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Uranium Enrichment and Assessment

Uranium enrichment. 1982 annual report, 8:31245 (R;US)

USDOE Bartlesville Energy Technology Center, OK

Abandoned oil fields in Alaska, California, Colorado, Montana, North Dakota, Utah and Wyoming, 8:31180 (R;US)

USDOE Bonneville Power Administration, Portland, OR

Energy-efficient electric motors: their control and application, 8:31955 (R;US)

USDOE Energy Information Administration, Washington, DC

Petroleum Supply Monthly, 8:31202 (R;US)

Weekly petroleum status report, 8:31204 (R;US)

USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels

Coal distribution, January-December 1982, 8:31158 (R;US)

Coal distribution, January-September 1982, 8:31157 (R;US)

Model documentation of the Short-Term Coal Analysis System, 8:31895 (R;US)

Nuclear plant cancellations: causes, costs, and consequences, 8:31674 (R;US)

USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use

1982 Annual Energy Review, 8:31894 (R;US)

Monthly energy review, 8:31911 (R;US)

Natural gas: use and expenditures, 8:31893 (R;US)

USDOE Office of Inspector General, Washington, DC

Appropriate-Technology Small-Grants Program, Chicago Operations Office, 8:31806 (R;US)

Excessive interest cost of letter-of-credit accounts, 8:31803 (R;US)

Follow-up inspection of the technical-evaluation process in the biomass-energy-systems program, 8:31805 (R;US)

Investigation into allegations of violations of Executive Order 12036, 8:31808 (R;US)

Need for departmental action to distribute funds in escrow accounts resulting from petroleum-pricing violations, 8:31213 (R;US)

Proposed changes in interest rate criteria and the amortization method for repayment of federal hydro-power investments, 8:31802 (R;US)

Unnecessary costs incurred in constructing oil pipelines for the Strategic Petroleum Reserve, 8:31212 (R;US)

USDOE Pittsburgh Energy Technology Center, PA

Construction and operation of a controlled-atmosphere, programmed-temperature reaction apparatus, 8:31064 (R;US)

Data base for fused-iron catalyst in the Fischer-Tropsch reaction, 8:31367 (R;US)

USDOE, Washington, DC

Energy and water development appropriations for 1984. Part 4. Department of Energy FY 1984 budget justifications. Hearings before the Subcommittee on Energy and Water Development, Committee on Appropriations, House of Representatives, Ninety-Eighth Congress, First Session, 8:32490 (R;US)

Technology assessment of productive conservation in urban transportation: an overview, 8:31951 (R;US)

Utah Univ., Salt Lake City (USA)

Operation of a high-P/sub T/ spectrometer arm at 10^{33} cm^{-2} sec^{-1} with particle identification, 8:32317 (R;US)

V

Viak AB, Vaellingby (Sweden)

Biological combustion in the Joenkoepings District, Sweden: overall inventory, 8:31390 (R;SE;SW)

Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)

Composite-flywheel durability and life. Part II. Long-term materials data, 8:31788 (R;US)

Magnetic monopoles: a status report, 8:32709 (R;US)

Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Mechanical Engineering

Optimization of a diffuser/ejector for ultra low-head hydroelectric systems. Final report, 8:31372 (R;US)

Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Physics

Magnetic monopole bibliography, 1981-1982, 8:32718 (R;US)

W

Washington Univ., Seattle (USA)

Measurement of high-p/sub T/ correlations in 340-GeV/c pp and 280-GeV/c πpp reactions, 8:32708 (R;US)

Nuclear magnetic resonance studies of ion motion in solid electrolytes. Annual report, June 1, 1982-March 31, 1983, 8:31795 (R;US)

Washington Univ., Seattle (USA). Dept. of Chemistry

Rubber elasticity. Progress report, February 2, 1982-March 30, 1983, 8:32092 (R;US)

Washington Univ., Seattle (USA). Dept. of Electrical Engineering

Ion dynamics and ordering in β and β''-alumina solid electrolytes, 8:31796 (R;US)

Washington Univ., Seattle (USA). Dept. of Microbiology
Study of the genetics and regulation of methane oxidation. Progress report, second year and a half, August 1, 1981-January 31, 1983, 8:32518 (R;US)
Washington Univ., Seattle (USA). Dept. of Nuclear Engineering
EPFL (Swiss) fusion-fission hybrid experiment. Progress report No. 4, August 1, 1982-October 31, 1982, 8:32882 (R;US)
Washington Univ., Seattle (USA). Dept. of Physics
Excited-state giant dipole resonances in (p,γ); a new probe of single-particle strengths, 8:32733 (R;US)
Parity nonconservation in the hydrogen atom, 8:32680 (R;US)
Washington Univ., Seattle (USA). Nuclear Physics Lab.
Elastic and inelastic scattering of polarized protons from lead-206 and lead-208 near isobaric analog resonances, 8:32746 (R;US)
^{183}Hf: a new stopwatch for the early solar system, 8:32651 (R;US)
How penetrable is the centrifugal barrier for fusion of ^{16}O with heavy targets, 8:32742 (R;US)
Westinghouse Electric Corp., Madison, PA (USA). Advanced Reactors Div.
Clinch River Breeder Reactor Plant Project. Summary edition. 1982 Technical progress report, October 1981-September 1982, 8:31655 (R;US)
Westinghouse Electric Corp., Mercury, NV (USA). Advanced Energy Systems Div.
Histories of spent-nuclear-fuel assemblies while at the E-MAD facility, December 1978-September 1982, 8:31640 (R;US)
Westinghouse Electric Corp., Pittsburgh, PA (USA). Nuclear Technology Div.
Hydrazine usage for corrosion control in PWR plants with powdered-resin-condensate polishers. Final report, 8:31643 (R;US)
Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Seventh quarterly project report, October 1982-December 1982, 8:31053 (R;US)
Westinghouse Research and Development Center, Pittsburgh, PA (USA)
Advanced atmospheric fluidized-bed combustion design: internally circulating AFBC. Final report, 8:31154 (R;US)
West Virginia Univ., Morgantown (USA). Dept. of Chemical Engineering
User's manual for computer simulation and design of the moving-bed coal gasifier. Final report, 8:31054 (R;US)
Wilhelm Engineering Co., Inc., Ashland, WI (USA)
Dual tube, counter flowing heat exchanger for turkey barns. Second quarterly report, 8:31938 (R;US)
Wisconsin Univ., Madison (USA)
Experiments on shear Alfven resonance in a tokamak, 8:32801 (R;US)
Liquid Li-Pb-Bi, a new tritium breeder, 8:32819 (R;US)
Nucleation and growth of defects in heavy-ion and electron-bombarded metals. Final report for the period ending February 29, 1980, 8:32016 (R;US)
Wisconsin Univ., Madison (USA). Dept. of Chemistry
Unimolecular dynamics of internal energy selected molecules. Technical progress report, 8:32180 (R;US)
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Qualifier
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The notations in the final parentheses indicate the type of document, e.g., R for Report; the country of publication, e.g., US; and the language if other than English, e.g., In German. Tables of document types and country of publication codes appear after the indexes.

The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept. (e.g. Pipeline Quality Gas see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed. Copies of DOE/TIC-7000, the Subject Thesaurus, are available from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, VA 22161.

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Urban integrated industrial cogeneration systems analysis. Phase I, final report. Volume 4. Environmental aspects of

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Prior to March, 1976, the descriptors COMBINED CYCLES and FOSSIL-FUEL POWER PLANTS or THERMAL POWER PLANTS were used for indexing this concept.
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Interaction of the plasma tail of comet Bradfield 1979L on 1980 February 6 with a possibly flare-generated solar-wind disturbance, 8:32655 (R:US)

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GSM: Geologic Simulation Model for a hypothetical site in the Columbia Plateau - large computer version. Technical report, 8:31287 (R:US)

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SIMULATE-E: a nodal core-analysis program for light-water reactors. Computer code user's manual, 8:31624 (R:US)

SPEAR-BETA fuel-performance code system: fission-gas-release module. Final report, 8:31626 (R:US)

Sulfate Regional Experiment: report of findings. Volume 3. Final report, 8:32413 (R:US)

SWENT: a three-dimensional finite-difference code for the simulation of fluid, energy, and solute radionuclide transport. Technical report, 8:32630 (R:US)

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In situ monitoring of electrochemical reactions by surface enhanced Raman scattering. Final report 1 Jul 80-31 Aug 82, 8:32045 (R:US)

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Hot-gas cleanup for molten carbonate fuel cells: dechlorination and soot formation. Quarterly report, September 16-December 15, 1982, 8:31929 (R:US)
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Fossil Energy Update: a current awareness journal (DOE abstract journal), 8:31018 (R:US)
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	8:32619	BNL—30735
AC02-76CH03000	**Fermi National Accelerator Lab., Batavia, IL (USA)**	
	8:32216	FERMILAB/TM—1181
	8:32217	FERMILAB/TM—1185
	8:32218	FERMILAB/TM—1191
	8:32301	FERMILAB/TM—1188
	8:32302	FERMILAB/TM—1189
	8:32337	FERMILAB/TM—1166
	8:32338	FERMILAB/TM—1182
	8:32339	FERMILAB/TM—1184
	8:32340	FERMILAB/TM—1186
	8:32341	FERMILAB/TM—1187
	8:32342	FERMILAB/TM—1190
	8:32361	FERMILAB/TM—1178
	8:32429	FERMILAB—83/29
	Tufts Univ., Medford, MA (USA)	
	8:32708	FERMILAB-Pub—83/30-EXP
	Fermi National Accelerator Lab., Batavia, IL (USA)	
	8:32709	FERMILAB-PUB—83/31
	8:32718	FERMILAB—82/92
AC02-76CH03073	**Princeton Univ., NJ (USA). Plasma Physics Lab.**	
	8:32902	PPPL—1988
AC02-76ER01167	**Chicago Univ., IL (USA)**	
	8:32739	DOE/ER/01167—T1
AC02-76ER01198	**Univ. of Illinois at Urbana, Champaign**	
	8:32060	Journal of Crystal Growth 51 377-379 (1981).
AC02-76ER01545	**Illinois Univ., Urbana (USA). Dept. of Physics**	
	8:32716	DOE/ER/01545—333
AC02-76ER02206	**Wisconsin Univ., Madison (USA)**	
	8:32016	DOE/ER/02206—10
AC02-76ER02383	**Illinois Univ., Urbana (USA). Dept. of Computer Science**	
	8:32933	UIUCDCS-R—82-1109
AC02-76ER02567	**Argonne National Lab., IL (USA)**	
	8:32186	ANL—82-88(Mar 1983).
AC02-76ER03077	**Fordham Univ, New York, NY**	
	8:32103	ACS Symposium Series NO. 173. 135-142 (1981).

Contract No.	Abstract No.	Report No.
AC02-76ET20279	Applied Research and Technology of Utah, Orem (USA)	
	8:31489	DOE/ET/20279—234
	Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.	
	8:31490	DOE/ET/20279—239
AC02-76ET37240	Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering	
	8:31656	DOE/ET/37240—92TR(Rev.1)
	Massachusetts Inst. of Tech., Cambridge (USA)	
	8:31657	DOE/ET/37240—102TR
AC02-76ET53016	Columbia Univ., New York (USA). Plasma Physics Lab.	
	8:32800	DOE/ET/53016—81
AC02-76ET53051	Wisconsin Univ., Madison (USA)	
	8:32801	DOE/ET/53051—50
	Wisconsin Univ., Madison (USA). Dept. of Physics	
	8:32802	DOE/ET/53051—53
AC02-76EV01599	Michigan State Univ., Hickory Corners	
	8:31402	Canadian Journal of Botany 60 NO. 1. 46-57 (1982).
	8:32481	Limnology and Oceanography 27 NO. 5. 839-848 (1982).
AC02-76EV03280	John Hopkins Univ., Baltimore, MD	
	8:32509	Biochemistry 21 5010-5015 (1982).
AC02-76EV03490	Rochester Univ., NY (USA). Dept. of Radiation Biology and Biophysics	
	8:32617	DOE/EV/03490—2250
AC02-77CH00178	Rockwell International Corp., Thousand Oaks, CA (USA). Microelectronics Research and Development Center	
	8:31392	SERI/TR—8032-1-T2
	Stanford Univ., CA (USA)	
	8:31393	SERI/TR—8104-4-T5
	DHR, Inc., Washington, DC (USA)	
	8:31550	SERI/STR—255-1782
	Michigan Univ., Ann Arbor (USA). Radiation Lab.	
	8:31573	SERI/STR—215-1879
	8:31574	SERI/STR—215-1880
	8:31575	SERI/STR—215-1881
AC02-77ER04217	Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Metallurgy and Materials Science	
	8:32074	DOE/ER/04217—7
AC02-77ER04496	Syracuse Univ., NY (USA)	
	8:32017	DOE/ER/04496—1
AC02-77ET25502	Diamond Shamrock Corp., Painesville, OH (USA). Electrolytic Systems Div.	
	8:31797	DOE/ET/25502—4
AC02-78ER05002	Massachusetts Inst. of Tech., Cambridge (USA)	
	8:32772	DOE/ER/05002—34
AC02-78ET51013	Massachusetts Inst. of Tech., Cambridge (USA). Plasma Fusion Center	
	8:32885	DOE/ET/51013—53
AC02-78EV04706	Manomet Bird Observatory, MA (USA)	
	8:32489	DOE/EV/04076—9
AC02-79ER10430	Pennsylvania State Univ., University Park (USA)	
	8:32018	DOE/ER/10430—2
AC02-79ET25411	Gibbs and Hill, Inc., New York (USA)	
	8:32003	DOE/ET/25411—T1
	AiResearch Mfg. Co., Torrance, CA (USA)	
	8:32004	DOE/ET/25411—T2
AC02-80CS83001	Lehigh Univ., Bethlehem, PA (USA). Center for Surface and Coatings Research	
	8:31380	DOE/CS/83001—1
AC02-80ER10689	Purdue Univ., Lafayette, IN (USA). Dept. of Chemistry	
	8:32157	DOE/ER/10689—3
AC02-80ER10755	Wisconsin Univ., Madison (USA). Dept. of Chemistry	
	8:32180	DOE/ER/10755—2
AC02-80ER10756	Columbia Univ., New York (USA). Dept. of Chemistry	
	8:32679	DOE/ER/10756—3
AC02-80ER10766	Arvin Calspan, Buffalo, NY (USA). Applied Technology Group	
	8:31593	DOE/ER/10766—10
AC02-80ER10773	Chicago Univ., IL (USA)	
	8:32650	DOE/ER/10773—2
AC02-80EV10379	Michigan Univ., Ann Arbor (USA)	
	8:32410	DOE/EV/10379—1
AC02-80RA50219	Southwest Research Inst., San Antonio, TX (USA)	
	8:31603	DOE/RA/50219—T1
AC02-81ER10938	Massachusetts Univ., Amherst (USA)	
	8:32166	DOE/ER/10938—2
AC02-81ER10957	Chicago Univ., IL (USA). Dept. of Physics	
	8:32729	DOE/ER/10957—2
AC02-81ER12003	Owens-Illinois, Inc., Toledo, OH (USA)	
	8:32494	DOE/ER/12003—T1
	8:32495	DOE/ER/12003—T2
AC02-82ER40073	Chicago Univ., IL (USA)	
	8:32717	DOE/ER/40073—1
AC02-82ER54013	Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering	
	8:32884	DOE/ER/54013—1
AC02-82ER60048	Colorado Univ., Denver (USA). Medical Center	
	8:32529	DOE/ER/60048—T1
AC02-83CH10140	Battelle Memorial Inst., Columbus, OH (USA). Office of Crystalline Repository Development	
	8:31267	BMI-OCRD—1
AC03-76ET12059	Santa Fe Energy Co., Santa Fe Springs, CA (USA). Western Div.	
	8:31182	DOE/ET/12059—5
AC03-76SF00098	Lawrence Berkeley Lab., CA (USA)	
	8:31232	LBL—14468
	8:31531	LBL—15296
	8:32160	LBL—11377
	8:32207	LBL—15825
	8:32246	LBL—12009-Rev.2
	8:32306	LBL—13241
	8:32307	LBL—14826
	8:32364	LBL—91-Suppl.
	8:32499	Biochemistry 21 NO. 19. 4686-4693 (14 Sep 1982).
	8:32683	LBL—15591
	8:32684	LBL—15902
	8:32736	LBL—15192
	8:32776	LBL—12223
AC03-76SF00515	Stanford Linear Accelerator Center, CA (USA)	
	8:32048	SLAC-TN—83-7
	8:32454	SLAC—260
AC03-80PC30259	Energy Development Consultants, Inc., Golden, CO (USA)	
	8:31184	DOE/PC/30259—1-Vol.1
	8:31185	DOE/PC/30259—1-Vol.2
AC03-81CS30574	Honeywell, Inc., Roseville, MN (USA). Technology Strategy Center	
	8:31520	DOE/CS/30574—T5
AC03-81ER52071	TRW Energy Development Group, Redondo Beach, CA (USA)	
	8:32881	DOE/ER/52071—T5
AC03-82SF11597	Black Hawk Associates, Denver, CO (USA)	
	8:31492	DOE/SF/11597—T1
AC03-82SF11645	SETS, Inc., Honolulu, HI (USA)	
	8:31515	DOE/SF/11645—T1
AC03-82SF11648	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Atlanta, GA	
	8:31914	DOE/SF/11648—T1
AC04-76DP00053	Monsanto Research Corp., Miamisburg, OH (USA). Mound	
	8:32148	MLM—3061(OP)
	8:32262	MLM—3062(OP)
	8:32437	MLM—3055

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AC04-76DP00487	**Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)**	
	8:32436	MHSMP—83-11
AC04-76DP00613	**Sumitomo Electric Industries Ltd., Osaka (Japan)**	
	8:32096	BDX—613-2943(Apr 1983).
	Bendix Corp., Kansas City, MO (USA)	
	8:32212	BDX—613-2914
	8:32239	BDX—613-2906
AC04-76DP00656	**General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.**	
	8:32093	GEPP-TIS—732
	8:32431	GEPP-EM—729
AC04-76DP00789	**Sandia National Labs., Albuquerque, NM (USA)**	
	8:31073	SAND—82-2318
	8:31125	SAND—82-2939C
	8:31188	SAND—82-2766C
	8:31225	SAND—82-2936C
	8:31226	SAND—82-2964C
	8:31241	SAND—83-0346
	8:31306	NUREG/CR—2391
	Oklahoma State Univ., Stillwater (USA). School of Electrical and Computer Engineering	
	8:31315	NUREG/CR—3191
	Sandia National Labs., Albuquerque, NM (USA)	
	8:31317	SAND—83-0826C
	Hughes Aircraft Co., Los Angeles, CA (USA)	
	8:31391	SAND—81-7193
	Sandia National Labs., Albuquerque, NM (USA)	
	8:31494	SAND—82-2239
	8:31567	SAND—81-2202
	HPT, Inc., Thousand Oaks, CA (USA)	
	8:31766	NUREG/CR—2005-Rev.1
	Sandia National Labs., Albuquerque, NM (USA)	
	8:31768	NUREG/CR—2634
	Decision Science Consortium, Inc., Falls Church, VA (USA)	
	8:31769	NUREG/CR—2743
	General Physics Corp., Columbia, MD (USA)	
	8:31770	NUREG/CR—2744/2
	Sandia National Labs., Albuquerque, NM (USA)	
	8:31772	NUREG/CR—3000
	8:31773	NUREG/CR—3100
	8:31775	NUREG/CR—3140
	8:31781	SAND—83-0600
	8:31782	SAND—83-0851C
	8:32046	SAND—83-0299
	8:32047	SAND—83-0500
	8:32229	SAND—82-1985
	8:32230	SAND—83-0816C
	8:32308	SAND—83-0559C
	8:32387	SAND—83-0730
	8:32450	SAND—83-0789
	8:32641	SAND—82-2505C
	8:32642	SAND—83-0332C
	8:32643	SAND—83-0821
	8:32644	SAND—83-2131C
	Sandia National Labs., Livermore, CA (USA)	
	8:32787	SAND—83-8212
	Sandia National Labs., Albuquerque, NM (USA)	
	8:32791	SAND—82-2517C
	8:32916	SAND—83-0526C
	8:32926	SAND—83-0042
	8:32927	SAND—83-0440
	8:32939	SAND—83-0485C
AC04-76DP03533	**Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant**	
	8:32162	RFP—3478
	8:32449	RFP—3464
AC04-79ER10465	**Univ. of New Mexico, Albuquerque**	
	8:32204	Inorganic Chemistry 22 NO. 2. 286-290 (19 Jan 1983).

Contract No.	Abstract No.	Report No.
AC05-76OR00001	**Goodyear Atomic Corp., Piketon, OH (USA)**	
	8:32430	GAT/GDP—1111
AC05-76OR00033	**Oak Ridge Associated Universities, Inc., TN (USA)**	
	8:31121	ORAU—211
	8:31828	Energy Economics 5 NO. 2. 74-88 (Apr 1983).
	8:31860	Energy Systems and Policy 7 NO. 1. 65-90 (1983).
	8:32507	Biochemical and Biophysical Research Communications 105 NO. 4. 1303-1308 (29 Apr 1982).
	8:32793	ORAU—212
	8:32915	DOE/OR/00033—T22
AC05-76OR01156	**NLO, Inc., Cincinnati, OH (USA)**	
	8:32438	NLCO—1187
AC06-76FF02170	**Hanford Engineering Development Lab., Richland, WA (USA)**	
	8:32925	HEDL-TC—2314
AC06-76RL01830	**Pacific Northwest Lab., Richland, WA (USA)**	
	8:31265	PNL—4517
	Battelle Memorial Inst., Columbus, OH (USA). Office of National Waste Terminal Storage Integration	
	8:31272	DOE/NWTS—147(1)
	8:31273	DOE/NWTS—147(2)
	Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation	
	8:31283	ONWI—9(82-4)
	INTERA Environmental Consultants, Inc., Houston, TX (USA)	
	8:31284	ONWI—420
	8:31285	ONWI—429
	8:31286	ONWI—434
	8:31287	ONWI—447
	8:31288	ONWI—452
	Pacific Northwest Lab., Richland, WA (USA)	
	8:31289	PNL—4576
	Bechtel Group, Inc., San Francisco, CA (USA)	
	8:31299	ONWI—470
	Pacific Northwest Lab., Richland, WA (USA)	
	8:31301	DOE/UMT—0213
	8:31371	PNL-SA—10995
	JBF Scientific Corp., Wilmington, MA (USA)	
	8:31572	PNL—3962-Rev.
	Pacific Northwest Lab., Richland, WA (USA)	
	8:31630	EPRI-NP—2939
	8:31647	NUREG/CR—3176
	8:31947	PNL—3733
	8:32366	PNL—4481
	8:32386	PNL—4620
	8:32419	PNL-SA—10606
	8:32448	PNL-SA—11186
	8:32477	PNL—4202
	8:32488	NUREG/CR—3136
	8:32583	PNL-SA—11069
	INTERA Environmental Consultants, Inc., Houston, TX (USA)	
	8:32630	ONWI—457
	8:32635	Water Resources Research 18 NO. 4. 1193-1214 (Aug 1982).
	RE/SPEC, Inc., Rapid City, SD (USA)	
	8:32638	ONWI—235
	INTERA Environmental Consultants, Inc., Houston, TX (USA)	
	8:32639	ONWI—437
	8:32640	ONWI—458
AC06-77RL01030	**Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations**	
	8:31290	RHO-BW-SR—82-2-4QP
	8:31291	RHO-BW-ST—27-P

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	8:31292	RHO-HS-SR—82-3-4Q-LIQP
	8:32478	1RHO-HS-SR—82-10-4QP
	8:32620	RHO-QA-VS—2P
AC06-81ER40048	Washington Univ., Seattle (USA). Nuclear Physics Lab.	
	8:32651	DOE/ER/40048—35-L2
	Washington Univ., Seattle (USA). Dept. of Physics	
	8:32680	DOE/ER/40048—44-L2
	8:32733	DOE/ER/40048—31-L2
	Washington Univ., Seattle (USA). Nuclear Physics Lab.	
	8:32742	DOE/ER/40048—42-L2
	8:32746	DOE/ER/40048—45-L2
AC07-76ID01570	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:31298	EGG-FM—6202
	8:31569	EGG-M—23982
	8:31620	EGG-M—29482
	8:31622	EGG-EE—6220
	8:31646	NUREG/CR—2780
	8:31713	B—286-0483
	8:31729	EGG-EE—6219
	8:31730	EGG-M—13782
	8:31731	EGG-PHYS—6201
	Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations	
	8:31733	GEND-INF—023-Vol.4
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:31734	GEND-INF—030
	NUS Corp., Gaithersburg, MD (USA)	
	8:31735	GEND-INF—032-Vol.1
	8:31736	GEND-INF—032-Vol.2
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:31737	GEND-INF—038
	8:31764	NUREG/CR—0169-Vol.1
	8:31776	NUREG/CR—3184
	8:31777	NUREG/CR—3216
	PAR Enterprises, Inc., Fairfax, VA (USA)	
	8:31939	EGG-CSH—6223
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:31993	EGG-PSE—5974
	8:32000	EGG-FM—6189
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:32458	EGG-HS—6213
AC07-79ID01675	Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)	
	8:31275	ENICO—1131
AC07-81ID12180	American Planning Association, Chicago, IL	
	8:31268	DOE/ID/12180—T1
AC08-76NV00410	Science Applications, Inc., Pleasanton, CA (USA)	
	8:31271	DOE/NV/00410—72
	Reynolds Electrical and Engineering Co., Inc., Las Vegas, NV (USA)	
	8:32397	CONF-830611—1
AC08-79ET27007	Earth Power Production Co., Salt Lake City, UT (USA)	
	8:31568	DOE/ET/27007—1
AC08-81NV10145	URS/John A. Blume and Associates, Engineers, San Francisco, CA (USA)	
	8:32220	JAB—10145-3
AC08-82NV10250	Westinghouse Electric Corp., Mercury, NV (USA). Advanced Energy Systems Div.	
	8:31640	DOE/NV/10250—6
AC08-83NV10282	EG and G, Inc., Goleta, CA (USA)	
	8:32761	CONF-830204—11
AC09-76SR00001	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.	
	8:31263	DPST—82-433
	8:31274	DPST—82-811
	8:32063	Microstructural Science 9 413-419 (1981).
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant	
	8:32113	DPST—82-86-4/5
	Environmental and Chemical Sciences, Inc., Aiken, SC (USA)	
	8:32467	DPST—83-439-Vol.1
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.	
	8:32558	DPST—82-475
AC09-78ET35900	Allied-General Nuclear Services, Barnwell, SC (USA)	
	8:31249	AGNS—35900-I.I-170
AC11-76PN00014	Bettis Atomic Power Lab., West Mifflin, PA (USA)	
	8:31659	WAPD-TM—1411
	8:31660	WAPD-TM—1514
AC11-76PN00292	Duquesne Light Co., Shippingport, PA (USA)	
	8:32428	DOE/PN/00292—T3
AC13-76GJ01664	Bureau of Mines, Salt Lake City, UT (USA). Salt Lake City Research Center	
	8:31242	GJBX—21(83)
	8:31243	GJBX—22(83)
	8:31244	GJBX—23(83)
	Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations	
	8:32475	GJO—113(83)
AC13-79GJ01692	High Life Helicopters, Inc., Puyallup, WA (USA)	
	8:31234	DOE/GJ/01692—T2
	8:31235	DOE/GJ/01692—T3
	8:31236	DOE/GJ/01692—T4
	8:31237	DOE/GJ/01692—T5
	8:31238	DOE/GJ/01692—T6
	8:31239	DOE/GJ/01692—T7
AC15-76CL50003	Westinghouse Electric Corp., Madison, PA (USA). Advanced Reactors Div.	
	8:31655	CRBRP-ARD—0322(Summ.)
AC18-81FC10297	Georgia Inst. of Tech., Atlanta (USA)	
	8:31094	DOE/FC/10297—T6
AC19-79BC10038	Terra Tek, Inc., Salt Lake City, UT (USA)	
	8:31219	DOE/BC/10038—27
AC19-79BC20001	Texas Univ., Austin (USA)	
	8:31179	DOE/BC/20001—11
AC19-80BC10033	Keplinger and Associates, Inc., Tulsa, OK (USA)	
	8:31177	DOE/BC/10033—7
AC19-80BC10362	Advanced Mechanical Technology, Inc., Newton, MA (USA)	
	8:31998	DOE/BC/10362—10
AC21-79MC10642	Physics International Co., San Leandro, CA (USA)	
	8:31183	DOE/MC/10642—1386
AC21-79MC11633	Purdue Univ., Lafayette, IN (USA). School of Chemical Engineering	
	8:31050	DOE/MC/11633—1404
AC21-79MC11843	Du Pont de Nemours (E.I.) and Co., Martinsburg, WV (USA). Potomac River Development Lab.	
	8:31220	DOE/MC/11843—1351
AC21-80MC14110	Burns and Roe Services Corp., Oradell, NJ (USA)	
	8:31147	DOE/MC/14110—1349
	8:31148	DOE/MC/14110—1350
AC21-80MC14591	General Electric Co., Schenectady, NY (USA). Corporate Research and Development Center	
	8:31052	DOE/MC/14591—1397
AC21-81MC16000	Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.	
	8:31149	DOE/MC/16000—1294-Vol.2
	8:31150	DOE/MC/16000—1294-Vol.3
	8:31151	DOE/MC/16000—1294-Vol.5
	8:31152	DOE/MC/16000—1294-Vol.6
	8:31153	DOE/MC/16000—1294-Vol.7
AC21-81MC16242	Physical Sciences, Inc., Andover, MA (USA)	
	8:31929	DOE/MC/16242—6
AC21-81MC16359	Pennsylvania State Univ., University Park (USA). Center for Air Environment Studies	
	8:32214	CAES—673-83

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AC21-81MC16372	Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center	
	8:31053	DOE/MC/16372—7
AC21-82MC19028	Aerodyne Research, Inc., Billerica, MA (USA). Center for Chemical and Environmental Physics	
	8:31145	ARI-RP—137
AC21-82MC19299	Lockheed Missiles and Space Co., Inc., Sunnyvale, CA (USA). Energy Systems	
	8:31067	LMSC-D—877750
AC21-82MC19329	Westinghouse Research and Development Center, Pittsburgh, PA (USA)	
	8:31154	DOE/MC/19329—1405
AC22-79PC20091	Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center	
	8:31112	DOE/PC/20091—T1
AC22-80PC30026	Amoco Research Center, Naperville, IL (USA)	
	8:31057	DOE/PC/30026—T4
AC22-80PC30085	Mitre Corp., McLean, VA (USA)	
	8:31058	DOE/PC/30085—T1
AC22-80PC30252	Duquesne Univ., Pittsburgh, PA (USA). Dept. of Chemistry	
	8:31084	DOE/PC/30252—T10
AC22-80PC30299	Spectron Development Labs., Inc., Costa Mesa, CA (USA)	
	8:31060	DOE/PC/30299—T7
AC22-81PC30019	Air Products and Chemicals, Inc., Allentown, PA (USA)	
	8:31056	DOE/PC/30019—T5
	8:31370	DOE/PC/30019—T6
AC22-81PC40785	SRI International, Menlo Park, CA (USA)	
	8:31062	DOE/PC/40785—7
AC22-82PC50041	Catalytic, Inc., Wilsonville, AL (USA)	
	8:31063	DOE/PC/50041—14
AC79-81BP25593	Oregon State Univ., Corvallis (USA). Dept. of Atmospheric Science	
	8:31577	DOE/BP—154
AC97-80ET46615	Texas Univ., Austin (USA). Bureau of Economic Geology	
	8:31172	DOE/ET/46615—T3
AC97-80ET46617	Texas Univ., Austin (USA). Bureau of Economic Geology	
	8:32621	DOE/ET/46617—T3
AI01-76ET20320	Technical Report Services, Rocky River, OH (USA)	
	8:31578	DOE/NASA/0101—1
	National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center	
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	8:32005	DOE/NASA—0064-1
	National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center	
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AI01-77DP40042	Naval Research Lab., Washington, DC (USA)	
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AI01-79CS40152	Army Mobility Equipment Research and Development Command, Fort Belvoir, VA (USA). Electrical Power Lab.	
	8:31928	DOE/CS/40152—T2
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	8:32215	DOE/CS/40152—T1
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AS05-76ER03346	Georgia Inst. of Tech., Atlanta (USA). School of Chemistry	
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AS05-76ET28461	Texas Univ., Austin (USA). Bureau of Economic Geology	
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	8:32187	ANL—82-88(Mar 1983).
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	8:32886	GTFR—38
	Georgia Inst. of Tech., Atlanta (USA). School of Nuclear Engineering and Health Physics	
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	8:32181	Journal of the American Chemical Society 104 NO. 24. 6502-6505 (1 Dec 1982).
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	8:32730	DOE/ER/40008—32
AS05-82ER12061	Rutgers--the State Univ., New Brunswick, NJ (USA). Dept. of Physics	
	8:32019	DOE/ER/12061—1
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	8:32471	4 NO. 4. 619-621 (Sep 1978).

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	8:32806	GA-A—17087
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	8:32783	GA-A—17013(Mar 1983).
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	8:31552	UCLA-ENG—8077
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	Oak Ridge National Lab., TN (USA)	
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	Union Carbide Corp., Oak Ridge, TN (USA). Office of Health, Safety, and Environmental Affairs	
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	8:32503	Biochemistry 21 NO. 16. 3892-3899 (3 Aug 1982).
	8:32504	Biochemical and Biophysical Research Communications 107 NO. 2. 642-648 (30 Jul 1982).
	8:32505	Biochemical and Biophysical Research Communications 106 NO. 3. 779-785 (15 Jun 1982).
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	8:32519	Journal of Virology 45 NO. 1. 484-488 (Jan 1983).
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7228	NTIS (US Sales Only), PC A03/MF A01	DE83700357	MN -28	8:32310
7260	NTIS (US Sales Only), PC A03/MF A01	DE83700358	MN -28	8:32279
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779	NTIS (US Sales Only), PC A07/MF A01	DE83700378	MN -78	8:31636
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1582	UKAEA, Technology Division, AEE Winfrith, Dorchester, Dorset, England		ND -38	8:32211
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129	NTIS (US Sales Only), PC A03/MF A01	DE83700372	MN -80	8:31673
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9968	NTIS (US Sales Only), PC A03/MF A01	DE83700359	MN -28	8:32311
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82-0273	*See* AD-A-123653/8			8:32406
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105	NTIS, PC A05/MF A01	DE83011635	MN -11	8:31827
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137	NTIS, PC A02/MF A01	DE83011066	MN -90i	8:31145
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5911	NTIS (US Sales Only), PC A03/MF A01; 1	DE83901944	MN -95d	8:31950
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32581	NTIS, PC A02/MF A01; 1	DE83010854	MN -34D	8:32357

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32685	NTIS, PC A02/MF A01	DE83010015	MN -25	8:32104
32712	NTIS, PC A02/MF A01	DE83009728	MN -4	8:32155
32719	NTIS, PC A02/MF A01	DE83010851	MN -28	8:32358
32815	NTIS, PC A02/MF A01	DE83010880	MN -28	8:32314
32826	NTIS, PC A02/MF A01	DE83010856	MN -34D	8:32315
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32444	NTIS, PC A02/MF A01	DE83006493	MN -79p	8:31714
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673-83	NTIS, PC A05/MF A01; 1	DE83012121	MN -11	8:32214
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6121	NTIS (US Sales Only), PC A02/MF A01	DE83700351	MN -48	8:32526
6139	NTIS (US Sales Only), PC A02/MF A01	DE83700379	MN -78	8:31637
6140	NTIS (US Sales Only), PC A02/MF A01	DE83700348	MN -41	8:32549
6150	NTIS (US Sales Only), PC A02/MF A01	DE83700376	MN -80	8:31721
6183	NTIS (US Sales Only), PC A02/MF A01	DE83700380	MN -78	8:31638
6234	NTIS (US Sales Only), PC A02/MF A01	DE83700907	MN -34B	8:32649
6306	NTIS (US Sales Only), PC A02/MF A01	DE83700903	MN -20	8:32790
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2272	NTIS (US Sales Only), PC A02/MF A01	DE83700371	MN -25	8:31680
2273	NTIS (US Sales Only), PC A03/MF A01	DE83700316	MN -48	8:32550
2274	NTIS (US Sales Only), PC A05/MF A01	DE83700381	MN -78	8:31639
2278	NTIS (US Sales Only), PC A08/MF A01	DE83700354	MN -38	8:32688
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5158	NTIS (US Sales Only), PC A10/MF A01	DE83700323	MN -41	8:32427
5160	NTIS (US Sales Only), PC A03/MF A01	DE83700317	MN -48	8:32551
5162	NTIS (US Sales Only), PC A09/MF A01	DE83700319	MN -23	8:32552
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5162N81	NTIS (US Sales Only), PC A02/MF A01	DE83700827	MN -38	8:31648
5163N81	NTIS (US Sales Only), PC A03/MF A01	DE83700828	MN -38	8:31681
CONF-7411121-	(NSF-OCR engineering workshop on MHD materials, Cambridge, MA, USA, 20-22 Nov 1974)			
1	NTIS, PC A02/MF A01; 1	DE83008577	MN -90g	8:31921
CONF-750329-	(American Institute of Chemical Engineers meeting, Houston, TX, USA, 16 Mar 1975)			
5	NTIS, PC A02/MF A01	DE83008208	MN -90d	8:31037
CONF-7505154-	(Course on coal conversion processes, University Park, PA, USA, 19-23 May 1975)			
1	NTIS, PC A02/MF A01; 1	DE83008421	MN -90d	8:31040
CONF-751183-	(2. seminary of the commission for Europe (United Nations) for the desulfurization of fuel and stack gas, Washington, DC, USA, 11-20 Nov 1975)			
2	NTIS, PC A02/MF A01	DE83008219	MN -90b	8:31038
CONF-7511155-	(International congress of scientists on the human environment, Kyoto, Japan, 17-26 Nov 1975)			
1	NTIS, PC A02/MF A01; 1	DE83008214	MN -95e	8:31983
CONF-7705190-	(Symposium on enhanced oil recovery by displacement with saline solutions, London, UK, 20 May 1977) Houston, TX; Gulf Publishing Company (1979).			8:31190
CONF-770831-	(4. international conference on coal gasification, liquefaction and conversion to electricity, Pittsburgh, PA, USA, 4 Aug 1977)			
4	NTIS, PC A02/MF A01; 1	DE83008231	MN -90c	8:31039
CONF-7708130-	(Workshop on materials handling for tunnel construction, Keystone, CO, USA, 3-5 Aug 1977)			
1	NTIS, PC A03/MF A01	DE83007818	MN -88	8:31107
CONF-780228-	(AAAS meeting- Abstract cleared 9/22/77 with the title, "Is Zero Energy Growth Feasible in the Residential Sector?", Washington, DC, USA, Feb 1978)			
1	NTIS, PC A03/MF A01	DE83012100	MN -95d	8:31931
CONF-7907126-	(DOE/JPL conference on coal models and their use in government planning, Carmel, CA, USA, 1 Jul 1979)			
	NTIS, PC A13/MF A01	DE83007158	MN -90	8:31161

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CONF-800208-	(Topical meeting on inertial confinement fusion, San Diego, CA, USA, 26-28 Feb 1980)			
28	*See* UCRL-84006	DE83010614	MN -21	8:31320
CONF-8006253-	(Symposium on coal gasification and coal hydrogenation, Essen, F.R. Germany, 13 Jun 1980)			
	NTIS (US Sales Only), PC A04/MF A01; 1	DE83901174	MN -90c	8:31041
CONF-8009303-	(110. regular meeting of the Schweizerischer Handels- und Industrie-Verein, Zurich, Switzerland, 19 Sep 1980)			
Exc.	NTIS (US Sales Only), PC A03/MF A01	DE83901179	MN -13	8:31800
CONF-8010203-	(Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct-9 Nov 1980)			
3	NTIS, PC A02/MF A01	DE83010742	MN -21	8:32832
CONF-801263-	(Symposium on surface mining hydrology, sedimentology and reclamation, Lexington, KY, USA, 1-5 Dec 1980)			
2	NTIS, PC A02/MF A01; 1	DE83010589	MN -90i	8:31091
CONF-810203-	(AIME annual meeting, Chicago, IL, USA, 22-26 Feb 1981)			
19	NTIS, PC A02/MF A01	DE83010586	MN -4	8:32177
CONF-810292-	(1. Neckar ecology symposium, Heidelberg, F.R. Germany, 16-17 Feb 1981)			
	NTIS (US Sales Only), PC A07/MF A01	DE83901176	MN -11	8:32472
CONF-8103165-	(3. seminar on MHD-flows and turbulence, Beer-Sheva, Israel, 23-27 Mar 1981)			
1	NTIS, PC A03/MF A01	DE83009025	MN -90g	8:31922
CONF-8104184-	(6. meeting of experts-reliability and maintenance problems of large scale wind energy conversion systems, Aalborg, Denmark, 29-30 Apr 1981)			
	See Juel-Spez-129	DE83750261	MN -60	8:31590
CONF-8104190-	(8. annual meeting of National Organization of Black Chemists and Chemical Engineers, Chicago, IL, USA, 22-25 Apr 1981)			
2	NTIS, PC A02/MF A01	DE83010557	MN -90e	8:31146
CONF-8104191-	(NAG users association inaugural meeting, Oxford, UK, 8 Apr 1981)			
1	NTIS, PC A02/MF A01	DE83007757	MN -32	8:32919
CONF-810566-	(International conference on fast ionic transport in solids, Gatlinburg, TN, USA, 18-22 May 1981)			
14	NTIS, PC A02/MF A01	DE83010582	MN -34	8:32770
CONF-8105192-	(48. FGU seminar on radioecology and radiation protection, Berlin, F.R. Germany, 20-22 May 1981)			
	Berlin, Germany, F.R.; Fortbildungszentrum Gesundheits- und Umweltschutz (1981).			8:32595
CONF-8105194-	(Seminar of investigating the construction of nuclear power plant in Iran, Isfahan, Iran, 10-12 May 1981)			
Absts.	*See* AEOI-129	DE83700372	MN -80	8:31673
CONF-810705-	(16. annual conference of the Microbeam Analysis Society, Vail, CO, USA, 13-17 Jul 1981)			
9	NTIS, PC A02/MF A01	DE83010706	MN -25	8:32112
CONF-810728-	(9. international conference on atomic collisions in solids, Lyon, France, 6-10 Jul 1981)			
11	NTIS, PC A02/MF A01	DE83010597	MN -25	8:32012
CONF-810803-	(Topical meeting on reactor safety aspects of fuel behavior, Sun Valley, ID, USA, 2-6 Aug 1981)			
35	NTIS, PC A02/MF A01	DE83010596	MN -79p	8:31722
CONF-8108140-	(9. international conference on sarcoidosis, Paris, France, 31 Aug-4 Sep 1981)			
1	*See* CEA-CONF-6121	DE83700351	MN -48	8:32526
CONF-810927-	(3. symposium on turbulent shear flow, Davis, CA, USA, 9-11 Sep 1981)			
1-Rev.2	*See* LBL-12009-Rev.2	DE83009946	MN -38	8:32246
CONF-8109199-	(Soviet/Japan symposium on fast charged particles interactions with crystals, Novosibirsk, USSR, 28 Sep-2 Oct 1981)			
1	*See* JINR-R-7-81-610	DE83700902	MN -34A	8:32745
CONF-8109203-	(ENERGOPLAN congress: energy as a chance for success, Wiesbeden, F.R. Germany, 24-25 Sep 1981)			
	NTIS (US Sales Only), PC A16/MF A01; 1	DE83901273	MN -95	8:31963
CONF-8109217-	(LABCON '81 conference, Chicago, IL, USA, 17 Sep 1981)			
1	NTIS, PC A02/MF A01	DE83009499	MN -80	8:31675
CONF-811014-	(11. North American Thermal Analysis Society conference, New Orleans, LA, USA, 19-21 Oct 1981)			
4	NTIS, PC A02/MF A01	DE83010701	MN 94c	8:31926
CONF-811040-	(9. symposium on engineering problems of fusion research, Chicago, IL, USA, 26-29 Oct 1981)			
202	NTIS, PC A02/MF A01	DE83010555	MN -20d	8:32819
203	NTIS, PC A02/MF A01	DE83010554	MN -20d	8:32820
CONF-811091-	(Workshop on parameterization of mixed layer diffusion, Las Cruces, NM, USA, 20-22 Oct 1981)			
4	NTIS, PC A02/MF A01	DE83010018	MN -11	8:32404
5	NTIS, PC A02/MF A01	DE83010023	MN -11	8:32405
CONF-8110118-	(3. neutral beam workshop jointly sponsored by DOE/IAEA/ORNL, Gatlinburg, TN, USA, 19-23 Oct 1981)			
	NTIS, PC A99/MF A01; 1	DE83006388	MN -20a	8:32833
CONF-8110126-	(International meeting on the radiobiology of radium and actinides in man, Lake Geneva, WI, USA, 12-16 Oct 1981)			
8	NTIS, PC A02/MF A01	DE83010634	MN -41	8:32553
9	NTIS, PC A03/MF A01; 1	DE83010703	MN -48	8:32554

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11	NTIS, PC A03/MF A01; 1	DE83010640	MN -48	8:32556
12	NTIS, PC A03/MF A01	DE83010638	MN -48	8:32557
13	NTIS, PC A02/MF A01	DE83010556	MN -11	8:32482
CONF-8110185-	(AFCET automation congress, Nantes, France, 27-29 Oct 1981)			
2	*See* CEA-CONF-6150	DE83700376	MN -80	8:31721
CONF-811108-	(Annual meeting of the American Institute of Chemical Engineers, New Orleans, LA, USA, 8-12 Nov 1981)			
24	NTIS, PC A03/MF A01	DE83010630	MN -4	8:31092
CONF-811145-	(International conference on neutron irradiation effects, Argonne, IL, USA, 9-12 Nov 1981)			
19	NTIS, PC A02/MF A01	DE83010600	MN -25	8:32319
CONF-811159-	(109. annual meeting of the American Public Health Association, Los Angeles, CA, USA, 1-5 Nov 1981)			
4	*See* BNL-30750	DE83010850	MN -41	8:32598
5	*See* BNL-30735	DE83010827	MN -41	8:32619
CONF-8111140-	(4. international coal utilization conference, Houston, TX, USA, 17-19 Nov 1981)			
1	NTIS, PC A02/MF A01	DE83010635	MN -90c	8:31048
CONF-811236-	(Workshop on assessing health impacts of energy technologies at the regional or national levels, Upton, NY, USA, 7-8 Dec 1981)			
4	*See* BNL-30750	DE83010850	MN -41	8:32598
CONF-811263-	(Conference on protection during medical use of ionizing and non ionizing radiations, Cannes, France, 14-16 Dec 1981)			
1	*See* CEA-CONF-6140	DE83700348	MN -41	8:32549
CONF-811264-	(SFEN meeting on power station control to meet the electric network requirements, Paris, France, 8-9 Dec 1981)			
1	*See* CEA-CONF-6139	DE83700379	MN -78	8:31637
CONF-811265-	(Workshop on nuclear corrosion, Erlangen, F.R. Germany, 10-11 Dec 1981)			
1	*See* CEA-CONF-6183	DE83700380	MN -78	8:31638
CONF-820128-	(61. annual meeting of the Transportation Research Board, Washington, DC, USA, 18-22 Jan 1982)			
8	NTIS, PC A03/MF A01	DE83010735	MN -96	8:31951
CONF-820217-	(9. energy technology conference, Washington, DC, USA, 16-18 Feb 1982)			
10	NTIS, PC A02/MF A01	DE83010559	MN -94ca	8:31792
CONF-820371-	(17. Rencontre de Moriond meeting, Les Arcs, Savoie, France, 14-26 Mar 1982)			
6	*See* DESY-82-039	DE83750004	MN -34D	8:32696
CONF-820374-	(46. meeting of physicists, Muenster, F.R. Germany, 29 Mar-2 Apr 1982)			
1	*See* KFK-3106	DE83750038	MN -25	8:32028
CONF-8203110-	(Workshop on sublethal effect of stress on marine organisms, Pacific Grove, CA, USA, 30-31 Mar 1982)			
	NTIS, PC A05/MF A01	DE83009175	MN -11	8:32599
CONF-8203111-	(Meeting on general problems in physics, Wuerzburg, F.R. Germany, 1-5 Mar 1982)			
1	*See* IPF-82-1	DE83750250	MN -20f	8:32807
CONF-820466-	(3. workshop on grand unification, Chapel Hill, NC, USA, 15-17 Apr 1982)			
3	*See* ANL-HEP-CP-82-17	DE83010741	MN -34D	8:32694
CONF-820508-	(Spring meeting of the Electrochemical Society, Montreal, Canada, 9-14 May 1982)			
11	NTIS, PC A03/MF A01; 1	DE83010085	MN -93	8:31927
CONF-820582-	(24. COSPAR meeting, Ottawa, Canada, 17 May-2 Jun 1982)			
5	*See* RL-82-072	DE83700909	MN -34B	8:32659
CONF-8205102-	(Workshop on quark matter formation and heavy ion collisions, Bielefeld, F.R. Germany, 10-14 May 1982)			
4	*See* DESY-82-040	DE83750003	MN -34D	8:32712
CONF-8205148-	(3. international energy symposium - toward an efficient energy future, Knoxville, TN, USA, 27 May 1982)			
	Ballinger Publishing Co., 54 Church Street, Cambridge, MA 02138		MN -13	8:31855
CONF-8205152-	(6. conference on telemetry, Garmisch-Partenkirchen, F.R. Germany, 10-14 May 1982)			
	NTIS (US Sales Only), PC A18/MF A01; 1	DE83901188	MN -60	8:32381
CONF-820601-	(ASME pressure vessel and piping conference, Orlando, FL, USA, 27 Jun-1 Jul 1982)			
30	NTIS, PC A03/MF A01; 1	DE83010575	MN -79p	8:31723
31	NTIS, PC A03/MF A01; 1	DE83010562	MN -79p	8:31651
32	NTIS, PC A03/MF A01	DE83010577	MN -79p	8:31724
CONF-820612-	(Symposium on instrumentation and control for fossil energy processes, Houston, TX, USA, 7-9 Jun 1982)			
	See ANL-82-62	DE83006229	MN -89	8:31019
CONF-820618-	(International conference on plasma physics, Goteborg, Sweden, 7-21 Jun 1982)			
11	*See* CEA-CONF-6306	DE83700903	MN -20	8:32790
CONF-820621-	(30. power sources symposium, Atlantic City, NJ, USA, 7-10 Jun 1982)			
7	NTIS, PC A02/MF A01	DE83010564	MN -94ca	8:31793

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CONF-820645-	(20. symposium on engineering aspects of magnetohydrodynamics, Los Angeles, CA, USA, 14-16 Jun 1982)			
10	NTIS, PC A02/MF A01; 1	DE83010780	MN -90g	8:31919
11	NTIS, PC A02/MF A01	DE83010565	MN -90g	8:31920
CONF-820651-	(International symposium on the conditioning of radioactive wastes for storage and disposal, Utrecht, Netherlands, 21-25 Jun 1982)			
	Vienna, Austria; International Atomic Energy Agency (1983).			8:31297
CONF-8206116-	(DPF summer study on elementary particle physics and future facilities (APS), Aspen, CO, USA, 28 Jun-16 Jul 1982)			
30	*See* ANL-HEP-CP-38-21	DE83010705	MN -28	8:32693
CONF-8206145-	(Workshop on the galactic center, Pasadena, CA, USA, 7-8 Jun 1982)			
1	*See* CEA-CONF-6234	DE83700907	MN -34B	8:32649
CONF-8206169-	(SIMS conference - environmental epidemiology: risk assessment, Alta, UT, USA, 28 Jun-2 Jul 1982)			
	Philadelphia, PA; Society for Industrial and Applied Mathematics (1982).			8:32609
CONF-8206178-	(6. CADE conference on automated deduction, New York, NY, USA, 1 Jun 1982)			
3	NTIS, PC A02/MF A01; 1	DE83010721	MN -32	8:32920
4	NTIS, PC A02/MF A01	DE83010629	MN -38	8:32921
CONF-8206179-	(American Society of Agricultural Engineers summer meeting, Madison, WI, USA, 27-30 Jun 1982)			
2	American Society of Agricultural Engineers, St. Joseph, MI 49085		MN -60	8:31576
3	American Society of Agricultural Engineers, St. Joseph, MI 49085		MN -61a	8:31379
CONF-8206180-	(American Society of Civil Engineers conference on water and energy: technical and policy issues, Ft. Collins, CO, USA, 27 Jun 1982)			
1	NTIS MF A01; 2	DE83010560	MN -11	8:32473
CONF-8206182-	(Mid-Atlantic industrial waste conference, College Park, MD, USA, 27-29 Jun 1982)			
1	NTIS, PC A02/MF A01	DE83010566	MN -11	8:31208
CONF-820713-	(Institute of Nuclear Materials meeting, Washington, DC, USA, 19-21 Jul 1982)			
31	NTIS, PC A02/MF A01	DE83009942	MN -15	8:31308
CONF-820718-	(21. international conference on high energy physics, Paris, France, 29 Jul-8 Aug 1982)			
Exc.Summ.	*See* DESY-82-065	DE83750233	MN -34D	8:32702
CONF-820758-	(National RF technology research and development program conference, Gaithersburg, MD, USA, 13-15 Jul 1982)			
	NTIS, PC A09/MF A01; 1	DE83011060	STD -20a	8:32821
CONF-820804-	(3. world congress of nuclear medicine and biology, Paris, France, 29 Aug-2 Sep 1982)			
5	NTIS, PC A02/MF A01	DE83010794	MN -48	8:32198
CONF-820814-	(17. Intersociety Energy Conversion Engineering conference, Los Angeles, CA, USA, 8-13 Aug 1982)			
45	NTIS, PC A02/MF A01; 1	DE83010778	MN -96	8:32002
CONF-820864-	(4. europhysical topical conference on lattice defects in ionic crystals, Dublin, Ireland, 30 Aug-3 Sep 1982)			
5	NTIS, PC A02/MF A01	DE83010696	MN -4	8:32771
CONF-8208101-	(4. international symposium on radiopharmaceutical chemistry, Juelich, F.R. Germany, 23-27 Aug 1982)			
4	NTIS, PC A02/MF A01	DE83010563	MN -4	8:31321
CONF-8208126-	(7. symposium on operations research, St. Gallen, Switzerland, 19-21 Aug 1982)			
1	*See* IKE-4-109	DE83750421	MN -98F	8:31814
CONF-820929-	(IUPAP international conference on magnetism, Kyoto, Japan, 6-10 Sep 1982)			
14	NTIS, PC A02/MF A01	DE83010775	MN -25	8:32072
CONF-820942-	(Nuclear data for science and technology international conference, Antwerp, Belgium, 6-10 Sep 1982)			
29	NTIS, PC A02/MF A01; 1	DE83009085	MN -34C	8:32748
CONF-820950-	(Conference on the neutron and its applications, Cambridge, UK, 13-17 Sep 1982)			
9	NTIS, PC A02/MF A01; 1	DE83008944	MN -34C	8:32013
CONF-820983-	(Europhysics study conference on jet structure from quark and lepton interactions, Erice-Trapani-Sicily, Italy, 12-17 Sep 1982)			
4	*See* MPI-PAE/EXPL/EL-107	DE83750382	MN -34D	8:32720
CONF-820989-	(Workshop on science underground, Los Alamos, NM, USA, 27 Sep-1 Oct 1982)			
	American Institute of Physics, New York, NY			8:32368
CONF-820990-	(152. EUROMECH colloquium - experimental ayalysis of nonlinear problems in solid mechanics, Wuppertal, F.R. Germany, 21-24 Sep 1982)			
Absts.	*See* INIS-mf-7557	DE83780440	MN -25	8:32022
CONF-820998-	(Workshop on the interface between radiation physics and radiation chemistry, Argonne, IL, USA, 9-10 Sep 1982)			
	See ANL-82-85	DE83010693	STD -4	8:32183

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CONF-8209126-	(DOE communications managers workshop, Springfield, VA, USA, 27-28 Sep 1982)			
	NTIS, PC A12/MF A01; 1	DE83010280	MN -13	8:32914
CONF-8209127-	(Structure and properties of intergranular boundaries meeting, Caen, France, 6-9 Sep 1982)			
1	NTIS, PC A02/MF A01	DE83010755	MN -25	8:32073
CONF-821021-	(DOE statistical symposium, Idaho Falls, ID, USA, 13-14 Oct 1982)			
4	NTIS, PC A02/MF A01	DE83010715	MN -80	8:31725
CONF-821046-	(11. world conference of the International Nuclear Target Development Society, Seattle, WA, USA, 6-8 Oct 1982)			
4	NTIS, PC A02/MF A01	DE83009729	MN -25	8:32320
CONF-821049-	(TMS/AIME fall meeting(Radiation damage analysis for fusion reactors), St. Louis, MO, USA, 24-28 Oct 1982)			
21	NTIS, PC A03/MF A01; 1	DE83010702	MN -25	8:32014
CONF-821050-	(Cyclotron facility workshop, Bloomington, IN, USA, 27-31 Oct 1982)			
	Copyright Clearance Center, Inc., Box 765, Schenectady, NY 12301			8:32753
CONF-821074-	(Workshop on position-sensitive detection of thermal neutrons, Grenoble, France, 11-12 Oct 1982)			
4	NTIS, PC A02/MF A01	DE83010777	MN -37	8:32359
CONF-8210113-	(American Physical Society meeting on particles and fields, College Park, MD, USA, 28-30 Oct 1982)			
3	*See* ANL-HEP-CP-83-01	DE83010707	MN -34C	8:32312
CONF-821101-	(ASME winter annual meeting (Engineering applications of laser velocimetry/published in ASME Jr. Fluid Engineering), Phoenix, AZ, USA, 14-19 Nov 1982)			
22	*See* PPPL-1988	DE83010841	STD -20b	8:32902
CONF-821103-	(American Nuclear Society winter meeting, Washington, DC, USA, 14-19 Nov 1982)			
88	NTIS, PC A02/MF A01; 1	DE83010740	MN -79g	8:31652
CONF-821119-	(International symposium on recent advances in nuclear materials safeguards, Vienna, Austria, 8-12 Nov 1982)			
	Vienna, Austria; International Atomic Energy Agency (1983).			8:31318
	Vienna, Austria; International Atomic Energy Agency (1983).			8:31319
CONF-821123-	(7. conference on the application of accelerators in research and industry, Denton, TX, USA, 8-10 Nov 1982)			
39	NTIS, PC A02/MF A01	DE83010782	MN -28	8:32281
40	D; 2	DE83010760	MN -28	8:32321
CONF-821136-	(4. international conference on precipitation scavenging, dry deposition and resuspension, Santa Monica, CA, USA, 29 Nov-3 Dec 1982)			
23	NTIS, PC A02/MF A01	DE83010793	MN -11	8:32408
CONF-821155-	(International meeting on research and test reactor core conversions from HEU to LEU fuels, Argonne, IL, USA, 8-10 Nov 1982)			
8	NTIS, PC A02/MF A01	DE83010698	MN -80	8:31709
CONF-821159-	(5. solar wind conference, Woodstock, VT, USA, 1-5 Nov 1982)			
5	*See* LA-UR-83-1172	DE83011145	MN -34B	8:32656
6	*See* LA-UR-83-1023	DE83011332	MN -34B	8:32655
CONF-821211-	(5. DOE battery and electrochemical contractors' conference, Crystal City, VA, USA, 7-9 Dec 1982)			
11	NTIS, PC A02/MF A01	DE83010716	MN -96	8:31794
CONF-830118-	(11. international workshop on gross properties of nuclei and nuclear excitations, Hirschegg, Austria, 17-22 Jan 1983)			
2	*See* LBL-15192	DE83009094	MN -34C	8:32736
CONF-830204-	(International beta dosimetry symposium, Washington, DC, USA, 15-18 Feb 1983)			
11	NTIS, PC A02/MF A01	DE83009542	MN -41	8:32761
CONF-830210-	(5. topical conference on radio frequency plasma heating, Madison, WI, USA, 21-23 Feb 1983)			
18	*See* DOE/ET/53051-50	DE83011028	STD -20	8:32801
CONF-830223-	(Wire chamber conference, Vienna, Austria, 15-18 Feb 1983)			
4	*See* BNL-32581	DE83010854	MN -34D	8:32357
CONF-830224-	(DPF workshop on collider detectors: present capabilities and future possibilities, Berkeley, CA, USA, 28 Feb-4 Mar 1983)			
3	*See* ANL-HEP-CP-83-10	DE83010749	MN -34D	8:32356
4	*See* BNL-32719	DE83010851	MN -28	8:32358
5	*See* BNL-32826	DE83010856	MN -34D	8:32315
6	*See* BNL-32846	DE83011356	MN -34D	8:32316
7	*See* BNL-32848	DE83011357	MN -34D	8:32317
8	*See* BNL-32870	DE83011365	MN -34D	8:32318
CONF-830225-	(Nuclear fuel cycle information workshop, Oak Ridge, TN, USA, 15-17 Feb 1983)			
2	NTIS, PC A04/MF A01; 1	DE83009790	MN -83	8:31838
CONF-830227-	(Symposium on energy-efficient electric motors: their control and application, Portland, OR, USA, 23 Feb 1983)			
	NTIS, PC A06/MF A01	DE83010764	MN -95f	8:31955

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CONF-830301-	(ASME-JSME thermal engineering joint conference, Honolulu, HI, USA, 20-24 Mar 1983)			
15	*See* EGG-M-23982	DE82013233	MN -66a	8:31569
16	*See* EGG-M-13782	DE83009707	MN -66a	8:31730
CONF-830304-	(American Nuclear Society topical conference on computational methods, Salt Lake City, UT, USA, 28-31 Mar 1983)			
20	*See* EGG-M-29482	DE83010402	MN -80	8:31620
CONF-830307-	(6. American Meteorological Society symposium on turbulence and diffusion, Boston, MA, USA, 22-25 Mar 1983)			
16	NTIS, PC A02/MF A01	DE83010796	MN -11	8:32409
17	*See* PNL-SA-10606	DE83010346	MN -11	8:32419
CONF-830308-	(American Insititute of Chemical Engineers national meeting, Houston, TX, USA, 27-31 Mar 1983)			
11	*See* PNL-SA-10995	DE83010353	MN -13	8:31371
CONF-830311-	(Particle accelerator conference, Santa Fe, NM, USA, 21-23 Mar 1983)			
106	*See* ANL-HEP-CP-83-12	DE83010750	MN -28	8:32313
107	*See* ANL-HEP-CP-83-11	DE83010748	MN -28	8:32280
108	*See* ANL-HEP-CP-83-13	DE83010772	MN -28	8:32296
109	*See* ANL-HEP-CP-83-09	DE83010771	MN -28	8:32295
110	*See* SAND-83-0559C	DE83011281	MN -28	8:32308
111	*See* UCRL-88265	DE83011274	MN -28	8:32352
112	*See* LA-UR-83-1137	DE83011161	MN -28	8:32351
CONF-830337-	(Swiss Society of Astrophysics and Astronomy conference, Saas Fee, Switzeriand, 21-26 Mar 1983)			
10	*See* LA-UR-83-788	DE83010091	MN -34B	8:32654
CONF-830348-	(Conference on low energy ion beams-3, Loughborough, UK, 28-31 Mar 1983)			
1	*See* BNL-32815	DE83010880	MN -28	8:32314
CONF-830406-	(5. topical meeting on technology of fusion energy, Knoxville, TN, USA, 26-28 Apr 1983)			
12	*See* LA-UR-83-943	DE83009902	MN -32	8:32897
23	*See* UCRL-88224	DE83010370	MN -20	8:32903
24	*See* UCRL-88237	DE83010363	MN -20d	8:32904
25	*See* UCRL-88238	DE83010367	MN -20	8:32905
26	*See* UCRL-87498	DE83010984	MN -20	8:31365
27	NTIS, PC A02/MF A01	DE83011389	MN -20a	8:32822
28	NTIS, PC A02/MF A01; 1	DE83011392	MN -20a	8:32823
29	NTIS, PC A02/MF A01	DE83012041	MN -20f	8:32824
30	NTIS, PC A02/MF A01	DE83011399	MN -20a	8:32825
31	NTIS, PC A02/MF A01; 1	DE83011393	MN -20b	8:32795
32	NTIS, PC A02/MF A01; 1	DE83011394	MN -20f	8:32826
33	NTIS, PC A02/MF A01	DE83011395	MN -20d	8:32827
34	NTIS, PC A02/MF A01	DE83012067	MN -20a	8:32828
35	NTIS, PC A02/MF A01	DE83011397	MN -20c	8:32829
36	NTIS, PC A02/MF A01; 1	DE83011401	MN -20d	8:32830
37	NTIS, PC A02/MF A01	DE83012068	MN -20g	8:32796
CONF-830416-	(American Nuclear Society workshop on power plant security, Savannah, GA, USA, 24-27 Apr 1983)			
2	*See* SAND-83-0851C	DE83009690	MN -15	8:31782
CONF-830418-	(International conference on dimensional stability and mechanical behavior of irradiated metals and alloys, Brighton, UK, 11-14 Apr 1983)			
2-Draft	NTIS, PC A02/MF A01	DE83012071	MN -79r	8:31653
CONF-830419-	(16. rare earth research conference, Tallahassee, FL, USA, 18-21 Apr 1983)			
3	NTIS, PC A02/MF A01	DE83010723	MN -4	8:32199
CONF-830423-	(5. symposium on safeguards and nuclear material management, Versailles, France, 19-21 Apr 1983)			
3	*See* SAND-83-0826C	DE83008897	MN -15	8:31317
4	*See* LA-UR-83-1125	DE83011159	MN -15	8:31311
5	*See* LA-UR-83-1142	DE83011137	MN -15	8:31313
6	*See* LA-UR-83-1124	DE83011174	MN -15	8:31310
7	*See* LA-UR-83-1141	DE83011136	MN -15	8:31312
8	*See* LA-UR-83-1156	DE83011142	MN -15	8:31314
CONF-830425-	(Society of Photo-Optical Instrumentation Engineers conference, Santa Fe, NM, USA, 11-15 Apr 1983)			
9	*See* LA-UR-83-1096	DE83011168	MN -38	8:32261
10	*See* LA-UR-83-1044	DE83011327	MN -34	8:32146
11	*See* LA-UR-83-1024	DE83011331	MN -4	8:32168
12	*See* LA-UR-83-1171	DE83011144	MN -34	8:32240
13	*See* LA-UR-83-1224	DE83011179	MN -34	8:32241
14	*See* LA-UR-83-1223	DE83011178	MN -4	8:32147
15	*See* LA-UR-83-1139	DE83011135	MN -21	8:32900
16	*See* LA-UR-83-1010	DE83011318	MN -20d	8:32810
CONF-830427-	(1. international symposium on molten salt chemical and technical, Kyoto, Japan, 20-22 Apr 1983)			
2	NTIS, PC A02/MF A01	DE83010729	MN -25	8:32156
CONF-830434-	(16. oil shale symposium, Golden, CO, USA, 13-15 Apr 1983)			
2	*See* SAND-82-2936C	DE83009797	MN -91	8:31225
3	*See* SAND-82-2964C	DE83009084	MN -91	8:31226
4	*See* UCRL-88492	DE83010364	MN -91	8:31227
5	*See* UCRL-88505	DE83010362	MN -91	8:31230
6	*See* UCRL-88524	DE83010530	MN -91	8:31228

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CONF-830440-	(UCLA symposia on molecular and cellular biology, Keystone, CO, USA, 10-15 Apr 1983)			
1	*See* UCRL-88350	DE83010368	MN -48	8:32584
CONF-830442-	(CSNI specialist meeting on interaction of fire and explosion with ventilation systems in nuclear facilities, Los Alamos, NM, USA, 26-28 Apr 1983)			
1	*See* PNL-SA-11186	DE83010349	MN -83	8:32448
CONF-830446-	(American Power conference, Chicago, IL, USA, 18-20 Apr 1983)			
2	*See* GA-A-17037	DE83010932	MN -77	8:31649
CONF-830447-	(Workshop on small computers, Atlanta, GA, USA, 3-7 Apr 1983)			
2	NTIS, PC A02/MF A01; 1	DE83010714	MN -32	8:32917
CONF-830450-	(IAEA/WHO symposium on biological effects of low level radiation, Venice, Italy, 11-15 Apr 1983)			
1	*See* BNL-32840	DE83010855	MN -48	8:32548
CONF-830451-	(American Ceramic Society annual meeting, Chicago, IL, USA, 25-28 Apr 1983)			
1	*See* MLM-3062(OP)	DE83011024	MN -25	8:32262
CONF-830452-	(Technical meeting on non-inductive current drive in tokamaks, Abingdon, UK, 18-21 Apr 1983)			
1	*See* GA-A-17087	DE83010957	MN -20a	8:32806
2	*See* GA-A-17073	DE83010956	MN -20f	8:32805
CONF-830454-	(Southeastcon '83 IEEE Region 3 conference, Orlando, FL, USA, 10-14 Apr 1983)			
1	NTIS, PC A02/MF A01	DE83012096	MN -37	8:32380
2	NTIS, PC A02/MF A01	DE83012094	MN -63	8:31488
CONF-830455-	(Yamada conference on muon spin rotation and associated problems, Shimoda, Japan, 18-27 Apr 1983)			
2	*See* LA-UR-83-996	DE83011308	MN -34A	8:32775
CONF-830456-	(Symposium on quantum fluids and solids, Sanibel Island, FL, USA, 11-15 Apr 1983)			
1	*See* LA-UR-83-1252	DE83011150	MN -34	8:32690
2	*See* LA-UR-83-1070	DE83011325	MN -34	8:32689
CONF-830514-	(Offshore technology conference, Houston, TX, USA, 2-5 May 1983)			
1	*See* SAND-83-2131C	DE83006296	MN -11	8:32644
CONF-830528-	(7. international symposium on packaging and transportation of radioactive materials, New Orleans, LA, USA, 15-20 May 1983)			
1	*See* K/C-1425	DE83010352	MN -71	8:31264
CONF-830535-	(37. annual American Society for Quality Control congress, Boston, MA, USA, 24-26 May 1983)			
1	*See* DOE/NASA/31040-43	DE83010408	STD -96	8:32001
CONF-830538-	(6. international conference on radiation shielding, Tokyo, Japan, 16-20 May 1983)			
2	*See* LA-UR-83-1138	DE83011162	MN -32	8:32759
3	*See* LA-UR-83-1123	DE83011173	MN -34C	8:32758
CONF-830539-	(International meeting for radionuclide metrology - alpha particle spectrometry and low level measurement, Harwell, UK, 10-13 May 1983)			
1	*See* MLM-3061(OP)	DE83011208	MN -4	8:32148
CONF-830540-	(1. international material removal conference, Detroit, MI, USA, 3-5 May 1983)			
1	*See* Y/DZ-65	DE83011016	MN -69	8:32479
CONF-830601-	(10. international symposium on computer architecture, Stockholm, Sweden, 13-16 Jun 1983)			
1	*See* UCRL-88173	DE83000359	MN -32	8:32932
CONF-830603-	(Numerical analysis conference, Dundee, UK, 28 Jun-1 Jul 1983)			
1	*See* SAND-82-2517C	DE83003294	MN -32	8:32791
CONF-830604-	(ADINA and nonlinear finite element analysis conference, Cambridge, MA, USA, 15-17 Jun 1983)			
1	*See* LA-UR-82-3411	DE83003555	MN -32	8:32208
CONF-830605-	(24. symposium on rock mechanics, College Station, TX, USA, 20 Jun 1983)			
1	*See* SAND-82-2766C	DE83003276	MN -92a	8:31188
3	*See* SAND-82-2939C	DE83008207	MN -38	8:31125
4	*See* SAND-82-2505C	DE83008380	MN -11	8:32641
5	*See* UCRL-88390	DE83010369	MN -11	8:32646
CONF-830606-	(3. international conference on magagauss magnetic field generation and related topics, Novosibirsk, USSR, 13-17 Jun 1983)			
1	*See* UCRL-88281	DE83003877	MN -38	8:32906
2	*See* UCRL-88930	DE83009123	MN -34D	8:32908
3	*See* UCRL-88909	DE83009118	MN -34D	8:32907
4	*See* LA-UR-83-1011	DE83011317	MN -38	8:32898
5	*See* LA-UR-83-1083	DE83011166	MN -20a	8:32899
CONF-830607-	(American Society of Mechanical Engineers pressure vessel and piping conference, Portland, OR, USA, 19-24 Jun 1983)			
6	NTIS, PC A02/MF A01; 1	DE83010737	MN -79k	8:31654
CONF-830608-	(70. annual technical conference on the American Electroplaters' Society, Indianapolis, IN, USA, 26-30 Jun 1983)			
1-Rev.1	*See* UCRL-82797-Rev.1	DE83006409	MN -25	8:32050

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CONF-830609-	(ANS annual meeting, Detroit, MI, USA, 12-17 Jun 1983)			
1	*See* BNL-NUREG-32444	DE83006493	MN -79p	8:31714
2	*See* BNL-NUREG-32501	DE83006682	MN -78	8:31716
3	*See* BNL-NUREG-32496	DE83006681	MN -78	8:31715
4	*See* BNL-NUREG-32506	DE83007390	MN -78	8:31718
5	*See* BNL-NUREG-32502	DE83007392	MN -80	8:31717
6	NTIS, PC A02/MF A01	DE83007594	MN -20	8:32831
7	*See* BNL-NUREG-32574	DE83008588	MN -38	8:31719
8	*See* BNL-NUREG-32585	DE83008586	MN -38	8:31720
9	NTIS, PC A02/MF A01; 1	DE83009493	MN -78	8:31726
10	NTIS, PC A02/MF A01	DE83009608	MN -79k	8:31727
11	NTIS, PC A02/MF A01; 1	DE83010763	MN -79p	8:31728
CONF-830611-	(Rapid excavation and tunneling conference, Chicago, IL, USA, 12-16 Jun 1983)			
1	NTIS, PC A02/MF A01	DE83007538	MN -02	8:32397
CONF-830612-	(DIALOG update meeting, Los Angeles, CA, USA, 23-24 Jun 1983)			
1	*See* SAND-83-0485C	DE83007371	MN -13	8:32939
CONF-830613-	(Plasticity today symposium, Udine, Italy, 27-30 Jun 1983)			
1	*See* UCRL-88358	DE83008595	MN -25	8:32779
CONF-830614-	(7. DOE solar energy research conference, San Francisco, CA, USA, 1 Jun 1983)			
2	*See* BNL-32712	DE83009728	MN -4	8:32155
3	NTIS, PC A02/MF A01; 1	DE83010745	MN -61c	8:31377
CONF-830615-	(ASME summer meeting, Houston, TX, USA, 20-22 Jun 1983)			
1	*See* SAND-83-0332C	DE83007372	MN -11	8:32642
2	*See* UCRL-88862	DE83009240	MN -32	8:32780
3	NTIS, PC A03/MF A01; 1	DE83010711	MN -38	8:32918
CONF-830616-	(5. Rochester conference on coherence and quantum optics, Rochester, NY, USA, 13-15 Jun 1983)			
1	*See* UCRL-88884	DE83009239	MN -34A	8:32686
CONF-830617-	(76. annual meeting of the Air Pollution Control Association, Atlanta, GA, USA, 19-24 Jun 1983)			
1	*See* UCRL-88613	DE83009244	MN -11	8:32421
2	*See* UCRL-88938	DE83009246	MN -11	8:32940
3	*See* UCRL-88957	DE83009805	MN -11	8:32422
4	*See* LA-UR-83-636	DE83009913	MN -11	8:32416
CONF-830618-	(International conference on lightning and static electricity, Ft. Worth, TX, USA, 21-23 Jun 1983)			
1	*See* SAND-83-0816C	DE83009288	MN -38	8:32230
CONF-830619-	(3. international conference on magnetic fluids, Bangor, UK, 28-30 Jun 1983)			
1	*See* BNL-32685	DE83010015	MN -25	8:32104
CONF-830620-	(National Computer Graphics Association annual conference, Chicago, IL, USA, 26 Jun 1983)			
1	*See* SAND-83-0526C	DE83008909	MN -32	8:32916
CONF-830621-	(IEEE power electronics specialists conference, Albuquerque, NM, USA, 6-9 Jun 1983)			
1	*See* UCRL-88923	DE83009811	MN -38	8:32263
CONF-830622-	(American Solar Energy Society meeting, Minneapolis, MN, USA, 1-3 Jun 1983)			
1	*See* LA-UR-83-869	DE83010099	MN -59c	8:31530
2	NTIS, PC A02/MF A01	DE83010712	MN -64	8:31517
5	*See* DOE/NASA/20485-14	DE83011288	STD -63	8:31491
7	*See* LA-UR-83-1113	DE83011170	MN -37	8:32383
CONF-830623-	(New trends in unconventional approaches to magnetic fusion conference, Stockholm, Sweden, 16-18 Jun 1982)			
1	*See* UCRL-89018	DE83010064	MN -20	8:32909
CONF-830626-	(IEEE/ESMO conference, Atlanta, GA, USA, 9 Jun 1983)			
1	*See* DOE/EV/03490-2250	DE83010193	MN -48	8:32617
CONF-830627-	(Conference on tracer kinetics and physiologic modeling - theory to practice, St. Louis, MO, USA, 6 Jun 1983)			
1	*See* BNL-32841	DE83010853	MN -48	8:32525
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0578/ 034/ 8	*See* DOE/CH/90034-T1	DE81027311	MN -59c	8:31534
0578/ 034/ 8-HandBk.	*See* DOE/CH/90034-T1-HandBk.	DE81027310	MN -59c	8:31535
2383-0088	*See* UIUCDCS-R-82-1109	DE83011056	MN -32	8:32933
2456-81	*See* DOE/ET/53016-81	DE83012452	STD -20f	8:32800
4217-7	*See* DOE/ER/04217-7	DE83011047	MN -25	8:32074
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0322(Summ.)	NTIS, PC A02/MF A01	DE83007260	STD -79	8:31655
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92	Univ. of Texas, Center for Research in Water Resources, 10100 Burnet Road, Austin, TX 78758		MN -69	8:31209
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8117	NTIS (US Sales Only), PC A02/MF A01	DE83700324	MN -41	8:31692
8118	NTIS (US Sales Only), PC A03/MF A01	DE83700325	MN -41	8:31693
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8120	NTIS (US Sales Only), PC A03/MF A01	DE83700327	MN -41	8:31695
8121	NTIS (US Sales Only), PC A03/MF A01	DE83700328	MN -41	8:31696
8122	NTIS (US Sales Only), PC A03/MF A01	DE83700329	MN -41	8:31697
8123	NTIS (US Sales Only), PC A03/MF A01	DE83700330	MN -41	8:31698
8124	NTIS (US Sales Only), PC A02/MF A01	DE83700331	MN -41	8:31699
8125	NTIS (US Sales Only), PC A03/MF A01	DE83700332	MN -41	8:31700

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8128	NTIS (US Sales Only), PC A03/MF A01	DE83700335	MN -41	8:31703
8129	NTIS (US Sales Only), PC A02/MF A01	DE83700336	MN -41	8:31704
8130	NTIS (US Sales Only), PC A02/MF A01	DE83700337	MN -41	8:31705
8131	NTIS (US Sales Only), PC A02/MF A01	DE83700338	MN -41	8:31706
8132	NTIS (US Sales Only), PC A02/MF A01	DE83700339	MN -41	8:31707
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82-038	NTIS (US Sales Only), PC A02/MF A01	DE83750006	MN -34D	8:32711
82-039	NTIS (US Sales Only), PC A02/MF A01	DE83750004	MN -34D	8:32696
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DOE/CS/30378-1	NTIS MF A01; 2	DE83006821	MN -59	8:31519
DOE/CS/30574-T5	NTIS, PC A15/MF A01; 1	DE83008966	MN -59c	8:31520
DOE/CS/33977-T1	NTIS, PC A03/MF A01; 1	DE83012055	MN -59	8:31536
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14-Vol.4	NTIS, PC A05/MF A01; 1	DE83010329	MN -95f	8:31991
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DOE/CS/83001-1	NTIS, PC A04/MF A01; 1	DE83010989	STD -61a	8:31380
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0152	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -13	8:31803
0153	TIC	DE83008196	ND -22	8:31804
0155	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -92	8:31212
0158	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -61a	8:31805
0161	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -13	8:31806
0164	TIC	DE83008318	ND -92	8:31807
0168	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -92	8:31213
0169	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -13	8:31808
DOE/JPL-1012-80	NTIS, PC A03/MF A01	DE83011239	STD -63b	8:31381
DOE/JPL/1060-59	NTIS, PC A04/MF A01	DE83011240	STD -62	8:31375
DOE/JPL/956034-81/ 1	NTIS, PC A04/MF A01	DE83011263	STD -63b	8:31382
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1350	NTIS, PC A05/MF A01; 1	DE83010792	STD -90e	8:31148
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472	NTIS (US Sales Only), PC A03/MF A01	DE83750666	MN -95d	8:31940
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82-9	NTIS (US Sales Only), PC A02/MF A01; 1	DE83901786	MN -11	8:32474
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82-3	NTIS (US Sales Only), PC A02/MF A01	DE83901916	MN -32	8:32922
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2912	NTIS, PC A07/MF A01	DE83901933	MN -90d	8:31065
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82/ E/ 11	NTIS (US Sales Only), PC A03/MF A01	DE83750021	MN -25	8:32773
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46	NTIS (US Sales Only), PC A04/MF A01	DE83750258	MN -80	8:31738
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120	NTIS (US Sales Only), PC A03/MF A01	DE83750390	MN -80	8:31739
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788	NTIS (US Sales Only), PC A04/MF A01	DE83750019	MN -70	8:32459
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IFVE-OEF-				
81-161	NTIS (US Sales Only), PC A02/MF A01	DE83700356	MN -38	8:32219
IFVE-ONF-				
82-23	NTIS (US Sales Only), PC A02/MF A01	DE83700892	MN -34D	8:32731
IFVE-OTF-				
81-104	NTIS (US Sales Only), PC A02/MF A01	DE83700893	MN -34D	8:32732
81-177	NTIS (US Sales Only), PC A02/MF A01	DE83700894	MN -34D	8:32652
IIM/IP-				
81-24	Wissenschaftszentrum, Internationales Inst. fuer Management und Verwaltung, Berlin, Germany, F.R.		MN -97b	8:31910
IJS-P-				
294	NTIS (US Sales Only), PC A12/MF A01; 1	DE82903424	MN -13	8:31834
IKE-				
4-109	NTIS (US Sales Only), PC A02/MF A01; 1	DE83750421	MN -98F	8:31814
6-132	NTIS (US Sales Only), PC A04/MF A01	DE83750034	MN -78	8:31632
6-134	NTIS (US Sales Only), PC A05/MF A01	DE83750257	MN -80	8:31676
6-137	NTIS (US Sales Only), PC A04/MF A01	DE83750035	MN -78	8:31677
IKE-K-				
58/ 59	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750667	MN -95	8:31845
64	NTIS (US Sales Only), PC A03/MF A01; 1	DE83750243	MN -95d	8:31943
67	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750244	MN -95d	8:31944
INFO-				
0060	NTIS (US Sales Only), PC A06/MF A01	DE83700340	MN -41	8:31740
0061	NTIS (US Sales Only), PC A04/MF A01	DE83700341	MN -41	8:31741
INIS-mf-				
7476	NTIS (US Sales Only), PC A05/MF A01	DE83780431	MN -48	8:32521
7477	NTIS (US Sales Only), PC A05/MF A01	DE83780430	MN -48	8:32543
7482	NTIS (US Sales Only), PC A06/MF A01	DE83780437	MN -48	8:32530
7483	NTIS (US Sales Only), PC A05/MF A01	DE83780435	MN -48	8:32531
7486	NTIS (US Sales Only), PC A05/MF A01	DE83780436	MN -48	8:32532
7491	NTIS (US Sales Only), PC A18/MF A01	DE83780433	MN -80	8:31839
7493	NTIS (US Sales Only), PC A04/MF A01	DE83780434	MN -78	8:31744
7512	NTIS (US Sales Only), PC A10/MF A01	DE83780439	MN -25	8:32021
7513	NTIS (US Sales Only), PC A08/MF A01	DE83780438	MN -4	8:32167
7520	NTIS (US Sales Only), PC A05/MF A01	DE83780446	MN -41	8:31753
7527	NTIS (US Sales Only), PC A04/MF A01	DE83780444	MN -48	8:32538
7529	NTIS (US Sales Only), PC A05/MF A01	DE83780445	MN -48	8:32517
7533	NTIS (US Sales Only), PC A03/MF A01	DE83780442	MN -48	8:32569
7539	NTIS (US Sales Only), PC A06/MF A01	DE83780447	MN -41	8:31754
7553	NTIS (US Sales Only), PC A04/MF A01	DE83780443	MN -48	8:32579
7557	NTIS (US Sales Only), PC A02/MF A01	DE83780440	MN -25	8:32022
INS-R-				
270	NTIS (US Sales Only), PC A02/MF A01	DE83700342	MN -41	8:31756
272	NTIS (US Sales Only), PC A02/MF A01	DE83700311	MN -51	8:32628
274	NTIS (US Sales Only), PC A02/MF A01	DE83700353	MN -23	8:31329
284	NTIS (US Sales Only), PC A03/MF A01	DE83700361	MN -28	8:32303
INS-TH-				
133	NTIS (US Sales Only), PC A02/MF A01	DE83700831	MN -28	8:32354
134	NTIS (US Sales Only), PC A02/MF A01	DE83700832	MN -28	8:32355
135	NTIS (US Sales Only), PC A02/MF A01	DE83700833	MN -28	8:32362
137	NTIS (US Sales Only), PC A02/MF A01	DE83700834	MN -28	8:32343
139	NTIS (US Sales Only), PC A02/MF A01	DE83700835	MN -28	8:32344
IPF-				
82-1	NTIS (US Sales Only), PC A03/MF A01	DE83750250	MN -20f	8:32807
IPP-				
2/ 257	NTIS (US Sales Only), PC A02/MF A01	DE83750052	MN -20a	8:32888
III/ 74	NTIS (US Sales Only), PC A03/MF A01	DE83750051	MN -20a	8:32808
ITEF-				
25(1982)	NTIS (US Sales Only), PC A02/MF A01	DE83700906	MN -20	8:32889
116(1981)	NTIS (US Sales Only), PC A02/MF A01	DE83700362	MN -28	8:32304
124(1981)	NTIS (US Sales Only), PC A03/MF A01	DE83700908	MN -34B	8:32653
126(1981)	NTIS (US Sales Only), PC A03/MF A01	DE83700905	MN -20	8:32890
ITEP-				
136(1981)	NTIS (US Sales Only), PC A02/MF A01	DE83700895	MN -34D	8:32682
JAB-				
10145-3	NTIS, PC A05/MF A01	DE83011379	MN -38	8:32220
JINR-				
9-81-684	NTIS (US Sales Only), PC A02/MF A01	DE83700364	MN -28	8:32345
9-81-703	NTIS (US Sales Only), PC A02/MF A01	DE83700365	MN -28	8:32346
9-81-736	NTIS (US Sales Only), PC A02/MF A01	DE83700366	MN -28	8:32347

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13-81-847	NTIS (US Sales Only), PC A02/MF A01	DE83700363	MN -28	8:32348
JINR-R-				
2-81-799	NTIS (US Sales Only), PC A02/MF A01	DE83700896	MN -34D	8:32786
7-81-610	NTIS (US Sales Only), PC A02/MF A01	DE83700902	MN -34A	8:32745
9-82-70	NTIS (US Sales Only), PC A02/MF A01	DE83700368	MN -28	8:32349
11-81-796	NTIS (US Sales Only), PC A02/MF A01	DE83700367	MN -28	8:32305
JPL-				
9950-793	NTIS, PC A03/MF A01; 1	DE83011253	STD -95f	8:31976
JPL-PUB-				
83-4	*See* DOE/JPL/1060-59	DE83011240	STD -62	8:31375
83-8	*See* DOE/JPL-1012-80	DE83011239	STD -63b	8:31381
Juel-				
1771	NTIS (US Sales Only), PC A03/MF A01	DE83750020	MN -25	8:32026
1780	NTIS (US Sales Only), PC A05/MF A01	DE83750022	MN -48	8:32435
1781	NTIS (US Sales Only), PC A04/MF A01	DE83750030	MN -25	8:32027
1789	NTIS (US Sales Only), PC A12/MF A01	DE83750393	MN -34C	8:32750
1802	NTIS (US Sales Only), PC A03/MF A01	DE83750389	MN -20	8:32809
Juel-ICT-IB-				
468/ 82	NTIS (US Sales Only), PC A10/MF A01	DE83750026	MN -70	8:31277
Juel-Spez-				
129	NTIS (US Sales Only), PC A08/MF A01; 1	DE83750261	MN -60	8:31590
141	NTIS (US Sales Only), PC A07/MF A01	DE83750256	MN -37	8:32363
169	NTIS (US Sales Only), PC A04/MF A01; 1	DE83750669	MN -62	8:31547
184	NTIS (US Sales Only), PC A08/MF A01; 1	DE83750668	MN -62	8:31548
K/C-				
1425	NTIS, PC A02/MF A01	DE83010352	MN -71	8:31264
K/PS-				
352	NTIS, PC A03/MF A01	DE83011049	MN -4	8:32203
KFK-				
3106	NTIS (US Sales Only), PC A02/MF A01	DE83750038	MN -25	8:32028
3284	NTIS (US Sales Only), PC A03/MF A01	DE83750037	MN -79p	8:31757
3290	NTIS (US Sales Only), PC A13/MF A01	DE83750259	MN -70	8:31250
3311/ 1	NTIS (US Sales Only), PC A25/MF A01	DE83750249	MN -20d	8:32893
3311/ 2	NTIS (US Sales Only), PC A19/MF A01	DE83750262	MN -20d	8:32894
3329	NTIS (US Sales Only), PC A10/MF A01; 1	DE83750248	MN -41	8:32415
3330	NTIS (US Sales Only), PC A03/MF A01	DE83750039	MN -79	8:31758
3343	NTIS (US Sales Only), PC A02/MF A01	DE83750043	MN -78	8:31708
3361	NTIS (US Sales Only), PC A04/MF A01	DE83750018	MN -38	8:31686
3362	NTIS (US Sales Only), PC A04/MF A01	DE83750010	MN -28	8:32350
3363	NTIS (US Sales Only), PC A06/MF A01	DE83750013	MN -79	8:31759
3364	NTIS (US Sales Only), PC A06/MF A01	DE83750032	MN -37	8:32260
3365	NTIS (US Sales Only), PC A06/MF A01	DE83750023	MN -15	8:31309
3371	NTIS (US Sales Only), PC A03/MF A01	DE83750036	MN -37	8:32382
3372B	NTIS (US Sales Only), PC A03/MF A01	DE83750014	MN -80	8:31710
3377	NTIS (US Sales Only), PC A02/MF A01	DE83750009	MN -34C	8:32738
3380	NTIS (US Sales Only), PC A05/MF A01	DE83750050	MN -78	8:31645
3385	NTIS (US Sales Only), PC A07/MF A01	DE83750380	MN -48	8:32580
3389	NTIS (US Sales Only), PC A05/MF A01	DE83750240	MN -78	8:31658
3390	NTIS (US Sales Only), PC A05/MF A01	DE83750242	MN -80	8:31760
3408	NTIS (US Sales Only), PC A05/MF A01	DE83750241	MN -80	8:31633
3414	NTIS (US Sales Only), PC A09/MF A01; 1	DE83750420	MN -25	8:32076
KFK-PDV-				
210	NTIS (US Sales Only), PC A03/MF A01	DE83750011	MN -97a	8:31615
219	NTIS (US Sales Only), PC A06/MF A01	DE83750012	MN -97a	8:31616
220	NTIS (US Sales Only), PC A16/MF A01; 1	DE83750408	MN -97a	8:31617
KFK-PFT-				
7	NTIS (US Sales Only), PC A03/MF A01	DE83750024	MN -25	8:32094
10	NTIS (US Sales Only), PC A04/MF A01	DE83750033	MN -25	8:32029
25	NTIS (US Sales Only), PC A05/MF A01	DE83750031	MN -13	8:32222
KURRI-TR-				
204	NTIS (US Sales Only), PC A03/MF A01	DE82903629	MN -13	8:31761
LA-				
9479-PR	NTIS, PC A08/MF A01; 1	DE83003889	STD -48	8:32603
LA-tr-				
83-7	NTIS, PC A03/MF A01; 1	DE83011551	MN -10	8:31262
LA-UR-				
82-3411	NTIS, PC A03/MF A01; 1	DE83003555	MN -32	8:32208
83-636	NTIS, PC A03/MF A01	DE83009913	MN -11	8:32416
83-788	NTIS, PC A02/MF A01; 1	DE83010091	MN -34B	8:32654
83-869	NTIS, PC A02/MF A01	DE83010099	MN -59c	8:31530
83-943	NTIS, PC A02/MF A01	DE83009902	MN -32	8:32897
83-996	NTIS, PC A02/MF A01	DE83011308	MN -34A	8:32775
83-1010	NTIS, PC A02/MF A01; 1	DE83011318	MN -20d	8:32810
83-1011	NTIS, PC A03/MF A01	DE83011317	MN -38	8:32898
83-1023	NTIS, PC A02/MF A01; 1	DE83011332	MN -34B	8:32655
83-1024	NTIS, PC A02/MF A01	DE83011331	MN -4	8:32168
83-1044	NTIS, PC A02/MF A01	DE83011327	MN -34	8:32146
83-1070	NTIS, PC A02/MF A01	DE83011325	MN -34	8:32689
83-1083	NTIS, PC A03/MF A01	DE83011166	MN -20a	8:32899
83-1096	NTIS, PC A02/MF A01; 1	DE83011168	MN -38	8:32261
83-1113	NTIS, PC A02/MF A01	DE83011170	MN -37	8:32383
83-1123	NTIS, PC A02/MF A01; 1	DE83011173	MN -34C	8:32758
83-1124	NTIS, PC A02/MF A01; 1	DE83011174	MN -15	8:31310
83-1125	NTIS, PC A02/MF A01; 1	DE83011159	MN -15	8:31311
83-1137	NTIS, PC A02/MF A01	DE83011161	MN -28	8:32351

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83-1138	NTIS, PC A02/MF A01	DE83011162	MN -32	8:32759
83-1139	NTIS, PC A02/MF A01; 1	DE83011135	MN -21	8:32900
83-1141	NTIS, PC A02/MF A01	DE83011136	MN -15	8:31312
83-1142	NTIS, PC A02/MF A01	DE83011137	MN -15	8:31313
83-1156	NTIS, PC A02/MF A01	DE83011142	MN -15	8:31314
83-1171	NTIS, PC A02/MF A01	DE83011144	MN -34	8:32240
83-1172	NTIS, PC A02/MF A01; 1	DE83011145	MN -34B	8:32656
83-1223	NTIS, PC A02/MF A01	DE83011178	MN -4	8:32147
83-1224	NTIS, PC A02/MF A01	DE83011179	MN -34	8:32241
83-1252	NTIS, PC A02/MF A01	DE83011150	MN -34	8:32690
LBF-FB-				
162	NTIS (US Sales Only), PC A06/MF A01	DE83750025	MN -25	8:32038
163	NTIS (US Sales Only), PC A06/MF A01	DE83750015	MN -25	8:32039
164	NTIS (US Sales Only), PC A04/MF A01	DE83750016	MN -25	8:32040
LBL-				
91-Suppl.	NTIS, PC A05/MF A01; 1	DE83011015	MN -37	8:32364
11377	NTIS, PC A05/MF A01	DE83011132	STD -4	8:32160
12009-Rev.2	NTIS, PC A02/MF A01; 1	DE83009946	MN -38	8:32246
12223	NTIS, PC A06/MF A01; 1	DE83011744	MN -34	8:32776
13241	NTIS, PC A14/MF A01; 1	DE83011629	STD -32	8:32306
14468	NTIS, PC A07/MF A01	DE83011012	STD -91	8:31232
14826	NTIS, PC A13/MF A01; 1	DE83012472	MN -28	8:32307
15192	NTIS, PC A02/MF A01; 1	DE83009094	MN -34C	8:32736
15296	NTIS, PC A03/MF A01	DE83011570	STD -59	8:31531
15591	NTIS, PC A10/MF A01	DE83011740	MN -34A	8:32683
15825	NTIS, PC A06/MF A01; 1	DE83011683	MN -38	8:32207
15902	NTIS, PC A10/MF A01	DE83012436	MN -34A	8:32684
LIS-				
2	Available from Landesanstalt fuer Immissionsschutz des Landes Nordrhein-Westfalen, Essen (Germany, F.R.)			8:32417
LMSC-D-				
877750	NTIS, PC A05/MF A01; 1	DE83009538	MN -90b	8:31067
MEA-				
2011	*See* NUREG/CR-3229	DE83901754	MN -80	8:31678
MHSMP-				
83-11	NTIS, PC A04/MF A01	DE83011081	MN -11	8:32436
MINTEK-M-				
52	NTIS (US Sales Only), PC A03/MF A01	DE83901912	MN -32	8:32365
66	NTIS (US Sales Only), PC A03/MF A01	DE83901911	MN -25	8:32041
MLM-				
3055	NTIS, PC A04/MF A01	DE83011211	STD -41	8:32437
3061(OP)	NTIS, PC A02/MF A01	DE83011208	MN -4	8:32148
3062(OP)	NTIS, PC A02/MF A01; 1	DE83011024	MN -25	8:32262
MPI-PAE/Exp.El.-				
108	Available from Max-Planck-Institut fuer Physik und Astrophysik, Muenchen (Germany, F.R.)			8:32710
MPI-PAE/EXPL/EL-				
107	NTIS (US Sales Only), PC A02/MF A01	DE83750382	MN -34D	8:32720
MRP/MSL-				
78-230(IR)	Department of Energy, Mines and Resources, Mineral Sciences Labs., Ottawa, Ontario			8:31097
N-				
8229711	Avail: British Library Lending Div., Boston Spa, Engl.			8:31977
NASA-CR-				
159773	*See* DOE/NASA/0093-1	DE83011420	STD -96	8:32008
165463	*See* DOE/NASA/0101-1	DE83010077	STD -60	8:31578
165601	*See* DOE/NASA-0064-1	DE83010795	STD -96	8:32005
167921	*See* DOE/NASA/0198-1	DE83010779	MN -94c	8:31930
NASA-TM-				
82629	*See* DOE/NASA/20485-11	DE83011596	STD -63b	8:31383
82997	*See* DOE/NASA/51040-43	DE83010408	STD -96	8:32001
83036	*See* DOE/NASA/51044-29	DE83010986	STD -96	8:32006
83309	*See* DOE/NASA/20320-44	DE83011565	STD -60	8:31579
83329	*See* DOE/NASA/50194-37	DE83011334	STD -96	8:31999
83377	*See* DOE/NASA/20485-14	DE83011288	STD -63	8:31491
NCSR-R-				
28	National Centre of Systems Reliability, Culcheth, England			8:31118
ND-R-				
682(W)	NTIS (US Sales Only), PC A02/MF A01	DE83700830	MN -71	8:32227
NE-				
1980-13	NTIS (US Sales Only), MF A01; 2	DE82902532	MN -61a	8:31389
NE-F-				
6-5T-Rev.(3-83)	Participants in the Spec. NSMC Dist. Program. Others request from ORNL, NSMC		ND -79T	8:31671
NE-M-				
2-3T-Rev.(2-83)	Participants in the Spec. NSMC Dist. Program. Others request from ORNL, NSMC		ND -79Th	8:31661
NE-PROJ-				
3065-472	NTIS (US Sales Only), PC A20/MF A01; 1	DE82903365	MN -61	8:31390
NIIAR-				
32(485)	NTIS (US Sales Only), PC A02/MF A01	DE83700310	MN -25	8:32042
NLCO-				
1187	NTIS, PC A03/MF A01	DE83011022	MN -41	8:32438

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NMERDI-				
2-66-3104	NMERDI, Univ. of New Mexico, 117 Richmond Drive, NE, Albuquerque, NM 87106		MN -92a	8:31173
NP-				
25192	Univ. of Texas, Office for Public Sector Studies, Inst. of Latin American Studies, Austin, TX 78713		ND -92	8:31174
3900969	NTIS (US Sales Only), MF A01; 2	DE83900969	MN -88	8:31119
3901013	NTIS (US Sales Only), PC A07/MF A01; 1	DE83901013	MN -32	8:32228
3901143	NTIS (US Sales Only), PC A07/MF A01; 1	DE83901143	MN -4	8:31364
3901155	NTIS (US Sales Only), PC A04/MF A01	DE83901155	MN -38	8:32247
3901171	NTIS (US Sales Only), PC A09/MF A01; 1	DE83901171	MN -95d	8:31945
3901172	NTIS (US Sales Only), PC A07/MF A01; 1	DE83901172	MN -13	8:32269
3901173	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901173	MN -48	8:32604
3901175	NTIS (US Sales Only), PC A09/MF A01; 1	DE83901175	MN -11	8:32007
3901177	NTIS (US Sales Only), PC A05/MF A01; 1	DE83901177	MN -11	8:32418
3901178	NTIS (US Sales Only), PC A08/MF A01	DE83901178	MN -25	8:32080
3901180	NTIS (US Sales Only), PC A04/MF A01; 1	DE83901180	MN -13	8:31851
3901181	NTIS (US Sales Only), MF A01; 2	DE83901181	MN -13	8:31815
3901182	NTIS (US Sales Only), PC A02/MF A01	DE83901182	MN -13	8:31946
3901183	NTIS (US Sales Only), PC A02/MF A01	DE83901183	MN -95	8:31846
3901184	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901184	MN -92	8:31205
3901185	NTIS (US Sales Only), PC A02/MF A01; 1	DE83901185	MN -92	8:31199
3901186	NTIS (US Sales Only), PC A02/MF A01; 1	DE83901186	MN -13	8:31896
3901187	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901187	MN -11	8:32273
3901189	NTIS (US Sales Only), PC A08/MF A01; 1	DE83901189	MN -66a	8:31564
3901190	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901190	MN -4	8:32161
3901191	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901191	MN -11	8:32605
3901272	NTIS (US Sales Only), PC A04/MF A01; 1	DE83901272	MN -13	8:31994
3901274	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901274	MN -90d	8:31068
3901275	NTIS (US Sales Only), PC A05/MF A01; 1	DE83901275	MN -97e	8:31373
3901276	NTIS (US Sales Only), MF A01; 2	DE83901276	MN -4	8:32149
3901277	NTIS (US Sales Only), PC A09/MF A01; 1	DE83901277	MN -4	8:31830
3901278	NTIS (US Sales Only), PC A10/MF A01; 1	DE83901278	MN -11	8:32637
3901279	NTIS (US Sales Only), PC A10/MF A01	DE83901279	MN -4	8:32169
3901280	NTIS (US Sales Only), PC A10/MF A01; 1	DE83901280	MN -90c	8:31069
3901281	NTIS (US Sales Only), PC A07/MF A01; 1	DE83901281	MN -90a	8:31216
3901286	NTIS (US Sales Only), PC A09/MF A01; 1	DE83901286	MN -11	8:31105
3901287	NTIS (US Sales Only), PC A07/MF A01; 1	DE83901287	MN -95e	8:31978
3901288	NTIS (US Sales Only), PC A03/MF A01	DE83901288	MN -92	8:31852
3901289	NTIS (US Sales Only), PC A08/MF A01; 1	DE83901289	MN -92b	8:31200
3901290	NTIS (US Sales Only), PC A07/MF A01	DE83901290	MN -48	8:32522
3901291	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901291	MN -90c	8:31070
3901292	NTIS (US Sales Only), PC A07/MF A01; 1	DE83901292	MN -90d	8:31071
3901293	NTIS (US Sales Only), PC A10/MF A01; 1	DE83901293	MN -90c	8:31072
3901294	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901294	MN -88	8:31120
3901646	North Carolina Dept. of Natural Resources and Community Development, Raleigh		MN -11	8:32629
3901758	NTIS, PC A04/MF A01	DE83901758	MN -13	8:31873
3901760	Bureau of Economic Geology, Univ. of Texas, Austin, TX 78712		MN -92a	8:31175
3901761	Bureau of Economic Geology, Univ. of Texas, Austin, TX 78712		MN -51	8:31240
3901764	Bureau of Economic Geology, Univ. of Texas, Austin, TX 78712		MN -92a	8:31187
3901795	NTIS (US Sales Only), MF A01; 2	DE83901795	MN -62	8:31549
3901797	NTIS, PC A15/MF A01	DE83901797	MN -13	8:31853
3901987	NTIS, PC A02/MF A01	DE83901987	MN -98G	8:31912
3901990	NTIS, PC A03/MF A01	DE83901990	MN -98	8:31913
NRL-MR-				
5029	NTIS, PC A02/MF A01; 1	DE83011075	STD -21	8:32901
NRPB-R-				
122	NTIS (US Sales Only), PC A02/MF A01	DE83700312	MN -34B	8:32439
123	NTIS (US Sales Only), PC A02/MF A01	DE83700313	MN -34B	8:32440
124	NTIS (US Sales Only), PC A02/MF A01	DE83700314	MN -34B	8:32441
NUREG-				
0020-Vol.7-No.1	NTIS, PC A17/MF A01 - GPO	DE83901710	MN -80	8:31662
0040-Vol.7-No.1	NTIS, PC A13/MF A01 - GPO	DE83901955	MN -80	8:31663
0485-Vol.5-No.3	NTIS, PC A04/MF A01; 1 - GPO	DE83901645	MN -78	8:31664
0540-Vol.5-No.1	NTIS, PC A25/MF A01 - GPO	DE83901959	MN -80	8:31665
0748	NTIS, PC A14/MF A01; 1 - GPO	DE83901765	MN -80	8:31666
0869	NTIS, PC A05/MF A01; 1 - GPO	DE83901718	MN -80	8:31762
0887-Suppl.-No.3	NTIS, PC A04/MF A01 - GPO $5.00	DE83901728	MN -80	8:31667
0897	NTIS, PC A07/MF A01; 1 - GPO	DE83901719	MN -80	8:31763
0940-Vol.2-No.1	NTIS, PC A13/MF A01; 1 - GPO	DE83901712	MN -80	8:31668
0969	NTIS, PC A17/MF A01; 1 - GPO	DE83901794	MN -78	8:31634
0972	NTIS, PC A10/MF A01 - GPO	DE83901755	MN -80	8:31669
NUREG/BR-				
0051	NTIS, PC A03/MF A01 - GPO	DE83901957	MN -80	8:31670
NUREG/CR-				
0169-Vol.1	NTIS, PC A03/MF A01 - GPO	DE83010977	MN -78	8:31764
2001	NTIS, PC A05/MF A01 - GPO $5.50	DE83901796	MN -78	8:31765
2005-Rev.1	NTIS, PC A03/MF A01 - GPO $4.50	DE83012029	MN -80	8:31766
2069-Rev.	NTIS, PC A16/MF A01; 1 - GPO	DE83010920	MN -78	8:31767
2082	NTIS, PC A12/MF A01 - GPO $7.00	DE83010960	MN -70	8:31305
2391	NTIS, PC A07/MF A01; 1 - GPO $6.50	DE83010380	MN -70	8:31306

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2482-Vol.2	NTIS, PC A07/MF A01 - GPO $6.00	DE83011735	MN -70	8:31281
2634	NTIS, PC A03/MF A01	DE83006120	MN -79h	8:31768
2743	NTIS, PC A07/MF A01 - GPO	DE83012116	MN -78	8:31769
2744/ 2	NTIS, PC A09/MF A01; 1 - GPO	DE83012007	MN -32	8:31770
2780	NTIS, PC A03/MF A01 - GPO $4.75	DE83010651	MN -80	8:31646
2789	NTIS, PC A11/MF A01 - GPO	DE83010107	MN -78	8:31771
2965	NTIS, PC A04/MF A01 - GPO	DE83011270	MN -11	8:32476
3000	NTIS, PC A06/MF A01 - GPO	DE83009310	MN -79p	8:31772
3100	NTIS PC 04/MF A01; 1 - GPO	DE83010224	MN -70	8:31773
3117	NTIS, PC A07/MF A01; 1	DE83901958	MN -11	8:32636
3119-Vol.1	NTIS, PC A03/MF A01 - GPO $4.50	DE83901717	MN -80	8:31774
3136	NTIS, PC A05/MF A01; 1 - GPO $5.50	DE83012477	MN -51	8:32488
3140	NTIS MF A01; 2 - GPO $5.00	DE83012112	MN -78	8:31775
3176	NTIS (US Sales Only), PC A04/MF A01 - GPO $5.00	DE83011201	MN -78	8:31647
3184	NTIS PC E05/MF A01 - GPO	DE83012115	MN -78	8:31776
3191	NTIS, PC A04/MF A01	DE83011549	MN -15	8:31315
3216	NTIS, PC A06/MF A01; 1 - GPO	DE83010905	MN -78	8:31777
3229	NTIS, PC A02/MF A01 - GPO $3.25	DE83901754	MN -80	8:31678
3245	NTIS, PC A05/MF A01 - GPO	DE83011550	MN -41	8:32523
3255	NTIS, PC A06/MF A01 - GPO $5.50	DE83901711	MN -80	8:31778
3261	NTIS, PC A10/MF A01; 1 - GPO $7.00	DE83901713	MN -80	8:31679
3267	NTIS, PC A03/MF A01 - GPO	DE83011355	MN -78	8:31779
NZERDC-				
86	NTIS (US Sales Only), PC A03/MF A01	DE83901716	MN -95f	8:31979
NZERDC-P-				
65	NTIS (US Sales Only), PC A02/MF A01	DE83901630	MN -13	8:31809
71	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901660	MN -13	8:31834
72	NTIS (US Sales Only), PC A05/MF A01	DE83901661	MN -13	8:31819
OEFZS-				
4157	NTIS (US Sales Only), PC A04/MF A01	DE83700343	MN -41	8:31780
4161	NTIS (US Sales Only), PC A03/MF A01	DE83700374	MN -80	8:31687
4164	NTIS (US Sales Only), PC A04/MF A01	DE83700355	MN -38	8:32248
4168	NTIS (US Sales Only), PC A02/MF A01	DE83700318	MN -48	8:32582
ONWI-				
9(82-4)	NTIS, PC A09/MF A01; 1	DE83012117	MN -70	8:31283
235	NTIS, PC A05/MF A01	DE83011133	MN -70	8:32638
420	NTIS, PC A11/MF A01	DE83011522	MN -70	8:31284
429	NTIS, PC A08/MF A01	DE83011503	MN -70	8:31285
434	NTIS, PC A08/MF A01	DE83011504	MN -70	8:31286
437	NTIS, PC A11/MF A01; 1	DE83011523	MN -70	8:32639
447	NTIS (US Sales Only), PC E07/MF A01	DE83011671	MN -70	8:31287
452	NTIS (US Sales Only), PC E13/MF A01; 1	DE83011665	MN -70	8:31288
457	NTIS (US Sales Only), PC E12/MF A01; 1	DE83011666	MN -70	8:32630
458	NTIS, PC A05/MF A01; 1	DE83011519	MN -70	8:32640
470	NTIS, PC A04/MF A01; 1	DE83011126	MN -70	8:31299
ORAU-				
211	NTIS, PC A04/MF A01	DE83011210	MN -88	8:31121
212	NTIS, PC A04/MF A01	DE83011594	MN -2	8:32793
ORNL/EIS-				
202	NTIS, PC A05/MF A01	DE83011068	MN -45	8:32606
ORNL/HASRD-				
95	*See* NUREG/CR-2082	DE83010960	MN -70	8:31305
ORNL/NSIC-				
181/ R1	*See* NUREG/CR-2069-Rev.	DE83010920	MN -78	8:31767
210	*See* NUREG/CR-2789	DE83010107	MN -78	8:31771
ORNL/TM-				
2676/ R1	NTIS, PC A99/MF A01; 1	DE83011061	MN -80	8:31711
7672	NTIS, PC A06/MF A01	DE83011067	MN -88	8:31099
8630	*See* NUREG/CR-3245	DE83011550	MN -41	8:32523
ORNL-tr-				
4971	NTIS, PC A02/MF A01; 1	DE83010343	MN -25	8:32067
4972	NTIS, PC A10/MF A01; 1	DE83011733	MN -28	8:32294
4977	NTIS, PC A03/MF A01; 1	DE83011545	MN -20d	8:32913
ORO-				
4048	NTIS, PC A02/MF A01	DE83012024	MN -34C	8:32685
OTA-E-				
148	Office of Technology Assessment, Washington, DC 20510		MN -15	8:31316
P-				
110-82-004	California Energy Commission, Publications Unit, 1516 Ninth Street, Sacramento, CA 95814		MN -98E	8:31830
PATENTS-US-	(US: Commissioner of Patents, Washington, D.C. 20231, USA, $1.00 per copy. Government Patent Applications available from NTIS)			
4,229,184				8:31487
4,257,905				8:31619
4,289,967				8:32378
4,325,217				8:31925
4,343,176				8:32304
4,375,555				8:32170
4,376,384				8:32233
4,376,392				8:31982
4,376,462				8:31218
4,376,582				8:31691
4,376,598				8:31296
4,376,665				8:32368

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4,376,751				8:32097
4,376,752				8:32911
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4,377,238				8:31248
4,377,550				8:31690
4,377,553				8:31688
4,377,773				8:32353
4,377,880				8:32150
4,378,330				8:32232
4,378,545				8:32910
A 6-403,215				8:32385
RE30,898				8:32244
PB-				
83-128629	NTIS, PC A06/MF A01			8:31995
83-128942	NTIS PC E04/MF E04			8:31996
83-130229	NTIS, PC A07/MF A01			8:31606
83-130237	NTIS, PC A13/MF A01			8:31607
83-131045	NTIS, PC A05/MF A01			8:31608
83-133041	NTIS, PC A04/MF A01			8:32657
83-133488	NTIS, PC A12/MF A01			8:31980
83-134866	NTIS, PC A99/MF A01			8:32274
83-135020	Pub. in Proceedings of the International School of Intermediate Energy Nuclear Physics, Verona, Italy, July 16-26, 1981 p189-215.			8:32751
83-146845	NTIS, PC A03/MF A01			8:31330
83-147363	NTIS, PC A12/MF A01			8:31897
83-147777	NTIS, PC A09/MF A01			8:31167
83-148023	NTIS, PC A02/MF A01			8:31122
83-149070	NTIS, PC A05/MF A01			8:31123
83-149161	NTIS, PC A03/MF A01			8:31168
83-149443	NTIS, PC A02/MF A01			8:32044
83-149773	NTIS, PC A05/MF A01			8:32658
83-150029	NTIS, PC A07/MF A01			8:32469
83-150375	NTIS, PC A06/MF A01			8:31981
83-150672	NTIS, PC A03/MF A01			8:32442
83-150680	NTIS, PC A03/MF A01			8:32443
83-150698	NTIS, PC A03/MF A01			8:32444
83-150748	NTIS, PC A15/MF A01			8:31898
83-152223	NTIS, PC A06/MF A01			8:31124
83-152306	NTIS, PC A03/MF A01			8:31210
83-152512	NTIS, PC A05/MF A01			8:32445
83-152645	NTIS, PC A08/MF A01			8:31368
83-153148	NTIS, PC A05/MF A01			8:31100
83-153155	NTIS, PC A04/MF A01			8:31101
83-153601	NTIS, PC A05/MF A01			8:32446
83-154344	NTIS, PC A05/MF A01			8:32265
83-154617	NTIS, PC A08			8:31307
83-155309	NTIS PC $18.00/MF$18.00			8:32275
83-155317	NTIS, PC A03/MF A01			8:32447
83-155374	NTIS, PC A03/MF A01			8:31211
83-156422	NTIS, PC A11/MF A01			8:31102
83-156711	NTIS, PC A05/MF A01			8:31566
83-161398	NTIS, PC A02/MF A01			8:31221
83-161414	NTIS, PC A03/MF A01			8:31222
83-161422	NTIS, PC A03/MF A01			8:31088
83-161430	NTIS, PC A03/MF A01			8:32045
83-163154	NTIS, PC A99/MF E04			8:31609
83-165266	NTIS, PC A05/MF A01			8:31610
83-911501	NTIS, PC A06/MF A01; 1	DE83010620	MN -80	8:31635
PNL-				
3733	NTIS, PC A05/MF A01	DE83011376	MN -95d	8:31947
3962-Rev.	NTIS, PC A04/MF A01	DE83011154	MN -60	8:31572
4202	NTIS, PC A04/MF A01	DE83011074	MN -90d	8:32477
4481	NTIS, PC A04/MF A01	DE83012058	MN -41	8:32366
4517	NTIS, PC A05/MF A01	DE83011417	STD -85	8:31265
4539	*See* DOE/UMT-0213	DE83011464	MN -70	8:31301
4576	NTIS, PC A04/MF A01; 1	DE83012465	MN -70	8:31289
4604	*See* NUREG/CR-3136	DE83012477	MN -51	8:32488
4620	NTIS, PC A02/MF A01	DE83011471	MN -70	8:32386
4642	*See* NUREG/CR-3176	DE83011201	MN -78	8:31647
PNL-SA-				
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10995	NTIS, PC A02/MF A01	DE83010353	MN -13	8:31371
11069	NTIS, PC A20/MF A01	DE83011219	MN -48	8:32583
11186	NTIS, PC A02/MF A01; 1	DE83010349	MN -83	8:32448
PPPL-				
1988	NTIS, PC A02/MF A01	DE83010841	STD -20b	8:32902
PSI-TR-				
382	*See* DOE/MC/16242-6	DE83011368	MN -93	8:31929
PTB-W-				
17	NTIS (US Sales Only), PC A02/MF A01	DE83750029	MN -41	8:32256
RAND/R-				
2569-DOE	Santa Monica, CA; Rand Corp. (1981).	DE83011432	MN -13	8:31902

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RFP-				
3464	NTIS, PC A04/MF A01	DE83011597	STD -11	8:32449
3478	NTIS, PC A02/MF A01	DE83011152	STD -4	8:32162
RHO-BW-SR-				
82-2-4QP	NTIS, PC A03/MF A01	DE83010644	MN -70	8:31290
RHO-BW-ST-				
27-P	NTIS, PC A06/MF A01	DE83011092	STD -70	8:31291
RHO-HS-SR-				
82-3-4Q-LIQP	NTIS, PC A11/MF A01; 1	DE83010924	MN -70	8:31292
82-10-4QP	NTIS, PC A02/MF A01; 1	DE83011120	MN -11	8:32478
RHO-QA-VS-				
2P	NTIS, PC A04/MF A01	DE83011105	MN -41	8:32620
RL-				
82-016	NTIS (US Sales Only), PC A03/MF A01	DE83700897	MN -34A	8:32752
82-072	NTIS (US Sales Only), PC A02/MF A01	DE83700909	MN -34B	8:32659
RS-				
200/ 82	*See* OEFZS-4157	DE83700343	MN -41	8:31780
201/ 82	*See* OEFZS-4161	DE83700374	MN -80	8:31687
203/ 82	*See* OEFZS-4164	DE83700355	MN -38	8:32248
SAND-				
81-2202	NTIS, PC A07/MF A01	DE83011336	STD -66c	8:31567
81-2256	*See* NUREG/CR-2391	DE83010380	MN -70	8:31306
81-7074-Rev.1	*See* NUREG/CR-2005-Rev.1	DE83012029	MN -80	8:31766
81-7193	NTIS, PC A16/MF A01; 1	DE83011337	STD -63a	8:31391
82-0676	*See* NUREG/CR-2634	DE83006120	MN -79h	8:31768
82-1985	NTIS, PC A04/MF A01; 1	DE83011375	MN -32	8:32229
82-2239	NTIS, PC A02/MF A01	DE83011468	MN -63b	8:31494
82-2315	*See* NUREG/CR-3000	DE83009310	MN -79p	8:31772
82-2318	NTIS, PC A03/MF A01	DE83011373	MN -90d	8:31073
82-2505C	NTIS, PC A02/MF A01; 1	DE83008380	MN -11	8:32641
82-2517C	NTIS, PC A02/MF A01	DE83003294	MN -32	8:32791
82-2766C	NTIS, PC A02/MF A01	DE83003276	MN -92a	8:31188
82-2902	*See* NUREG/CR-3100	DE83010224	MN -70	8:31773
82-2936C	NTIS, PC A02/MF A01; 1	DE83009797	MN -91	8:31225
82-2939C	NTIS, PC A02/MF A01	DE83008207	MN -38	8:31125
82-2964C	NTIS, PC A02/MF A01	DE83009084	MN -91	8:31226
82-2985	*See* NUREG/CR-3140	DE83012112	MN -78	8:31775
82-7054	*See* NUREG/CR-2743	DE83012116	MN -78	8:31769
82-7057/ 2	*See* NUREG/CR-2744/2	DE83012007	MN -32	8:31770
83-0042	NTIS, PC A05/MF A01	DE83010697	MN -32	8:32926
83-0299	NTIS, PC A03/MF A01; 1	DE83011516	MN -25	8:32046
83-0332C	NTIS, PC A02/MF A01	DE83007372	MN -11	8:32642
83-0346	NTIS, PC A02/MF A01	DE83011340	MN -51	8:31241
83-0440	NTIS, PC A02/MF A01	DE83010720	MN -32	8:32927
83-0485C	NTIS, PC A02/MF A01	DE83007371	MN -13	8:32939
83-0500	NTIS, PC A02/MF A01	DE83009672	MN -25	8:32047
83-0526C	NTIS, PC A02/MF A01; 1	DE83008909	MN -32	8:32916
83-0559C	NTIS, PC A02/MF A01	DE83011281	MN -28	8:32308
83-0600	NTIS, PC A03/MF A01	DE83011374	STD -78	8:31781
83-0730	NTIS, PC A04/MF A01	DE83011134	MN -34	8:32387
83-0789	NTIS, PC A02/MF A01; 1	DE83011515	MN -11	8:32450
83-0816C	NTIS, PC A02/MF A01; 1	DE83009288	MN -38	8:32230
83-0821	NTIS, PC A03/MF A01	DE83011475	MN -70	8:32643
83-0826C	NTIS, PC A02/MF A01	DE83008897	MN -13	8:31317
83-0851C	NTIS, PC A02/MF A01; 1	DE83009690	MN -15	8:31782
83-2131C	NTIS, PC A03/MF A01	DE83006296	MN -11	8:32644
83-7012	*See* NUREG/CR-3191	DE83011549	MN -15	8:31315
83-8212	NTIS, PC A05/MF A01	DE83011520	MN -32	8:32787
SCPRI-RM-				
10-1981	NTIS (US Sales Only), PC A03/MF A01	DE83700344	MN -41	8:32451
11-1981	NTIS (US Sales Only), PC A03/MF A01	DE83700345	MN -41	8:32452
12-1981	NTIS (US Sales Only), PC A03/MF A01	DE83700346	MN -41	8:32453
SERI/STR-				
215-1879	NTIS, PC A04/MF A01; 1	DE83011343	MN -60	8:31573
215-1880	NTIS, PC A03/MF A01	DE83011342	MN -60	8:31574
215-1881	NTIS, PC A05/MF A01; 1	DE83011301	MN -60	8:31575
255-1782	NTIS, PC A09/MF A01; 1	DE83011153	STD -59c	8:31550
SERI/TR-				
8032-1-T2	NTIS, PC A07/MF A01; 1	DE83006113	STD -63b	8:31392
8104-4-T5	NTIS, PC A03/MF A01	DE82020947	MN -63b	8:31393
SLAC-				
260	NTIS, PC A03/MF A01	DE83011412	MN -11	8:32454
SLAC-TN-				
83-7	NTIS, PC A02/MF A01	DE83012025	MN -28	8:32048
SOLAR/0020-				
83/ 43	NTIS, PC A04/MF A01	DE83011084	STD -59	8:31532
SRD-R-				
229	United Kingdom Atomic Energy Authority, Wigshaw Lane, Culcheth Warrington, England		ND -41	8:32420
251	United Kingdom Atomic Energy Authority, Wigshaw Lane, Culcheth Warrington, England		ND -41	8:31783
TAC-RS-				
82-004	Univ. of New Mexico, Technology Application Center, Albuquerque		MN -11	8:32632

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TASC-TR-				
3016-3	NTIS, PC A07/MF A01; 1	DE83010821	STD -97c	8:31618
UCID-				
19401	NTIS, PC A05/MF A01	DE83011209	MN -25	8:32777
19615	NTIS, PC A09/MF A01; 1	DE83011419	MN -11	8:31376
19683	NTIS, PC A02/MF A01; 1	DE83012032	MN -34	8:32691
19760	NTIS, PC A02/MF A01	DE83012042	MN -4	8:31322
19777	NTIS, PC A02/MF A01	DE83012036	MN -32	8:32928
19778	NTIS, PC A02/MF A01; 1	DE83011215	MN -11	8:32401
19781	NTIS, PC A03/MF A01	DE83010921	MN -38	8:32398
19785	NTIS, PC A03/MF A01	DE83012035	MN -11	8:32633
19786	NTIS, PC A02/MF A01; 1	DE83012056	MN -32	8:32929
19787	NTIS, PC A02/MF A01	DE83012043	MN -4	8:32778
30190	NTIS, PC A04/MF A01; 1	DE83012114	MN -32	8:32930
UCLA-ENG-				
8076	NTIS, PC A08/MF A01; 1	DE83012054	MN -59	8:31551
8077	NTIS, PC A09/MF A01	DE83012057	MN -59	8:31552
8079	NTIS, PC A06/MF A01; 1	DE83012052	MN -59	8:31553
8080	NTIS, PC A05/MF A01	DE83012051	MN -59	8:31554
UCRL-				
15518	NTIS, PC A06/MF A01	DE83012120	MN -21	8:32049
15523-Pt.1	NTIS, PC A03/MF A01	DE83011279	MN -94b	8:31787
15523-Pt.2	NTIS, PC A15/MF A01	DE83011278	MN -94b	8:31788
15524	NTIS, PC A02/MF A01	DE83012107	MN -32	8:32792
15526	NTIS, PC A04/MF A01	DE83012108	MN -21	8:32811
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DK Denmark
DO Dominican Republic
DY Dahomey
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EA European American Committee Reactor Physics
EC Ecuador
ED European American Nuclear Data Committee
EG Egypt
ER European Space Research Organization
ES Spain
ET Ethiopia
EU European Company for the Chemical Processing of Irradiated Fuels

FI Finland
FJ Fiji
FR France

GA Gabon
GB United Kingdom of Great Britain and Northern Ireland (UK)
GD Grenada
GH Ghana
GM Gambia
GN Guinea
GQ Equatorial Guinea
GR Greece
GT Guatemala
GW Guinea-Bissau
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IG Inter-Governmental Maritime Consultative Organization
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TR Turkey
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TW Taiwan
TZ United Republic of Tanzania

UA Ukrainian Soviet Socialist Republic (Ukrainian SSR)
UE United Nations Educational, Scientific and Cultural Organization
UF United Nations Children's Fund
UG Uganda
UI United Nations Industrial Development Organization
US United States of America (USA)
UY Uruguay

VA Holy See
VD Democratic Republic of Viet-Nam
VE Venezuela
VS Republic of Viet-Nam

WM World Meteorological Organization
WS Western Samoa

XA International Atomic Energy Agency (IAEA)
XC European Organization for Nuclear Research (CERN)
XE Commission of the European Communities (CEC)
XF Food and Agriculture Organization of the United Nations (FAO)
XJ Joint Institute for Nuclear Research (JINR)
XM Council for Mutual Economic Assistance (CMEA)
XN Nuclear Energy Agency of the OECD (NEA)
XO Organization of African Unity (OAU)
XR International Commission on Radiological Protection (ICRP)
XS International Organization for Standardization (ISO)
XU United Nations (UN)
XW World Health Organization (WHO)
XX World Energy Conference (WEC)

YD Democratic Yemen
YE Yemen
YU Yugoslavia

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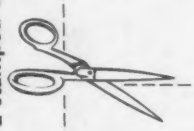

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